FS-5000/8000
Modification of PA and COUP Boards

Table

	Necessary Parts	Type	Code No.	Required for:
*	ROM (U3)	0550132102	005-927-430	Ⓐ (on COUP Board)
*	Silicone Sealant	KE-348T	000-801-041	
*	Resistors (R5/R8, 2 pcs.)	ERD-25PJ472 4.7K, 1/4W	000-330-373	
	Silicone Sealant	KE-348T	000-801-041	Ⓑ Installation of shunt capacitor on DUMMY LOAD PCB.
	DUMMY LOAD PCB	OP05-34	005-925-830	
	Antenna Capacitor (ceramic, for shunting)	DC-40, 50 pF or DC-40, 100 pF	000-258-695 000-258-696	
	Crimp-on lug (M4), Lug (M4), SWs (M4), Nut (M4), Screw M4 × 12, some wires 1.25 sq.			
*	Arrester Fixing Metal	05-039-6314	100-134-990	Installation of arrester fixing metal on ANTENNA COUPLER.
*	Ground Cable (with lugs at both ends)	–	–	
*	Cable Clamp (3 pcs.)	CK-05H	000-570-247	
	M4 Nut, Screw M4 × 25			
*	Transformer (T4)	5T814	000-122-137	Ⓒ (on PA Board) delivered as an assembly
*	Coaxial Cable	05S0689-0	000-119-452	
*	Transformer Clamp	05-039-6124	100-144-010	
*	Copper Strap (2 pcs.)	–	–	

(*): Free of charge

1. Tuning error on MF band (Modification on COUP board)

Factory-modified Units:

FS-5000	FS-8000
2508-0095, 0096, 0105 and after	2522-0013 and after

Modifications:

① **Replacement of ROM. (05501-32-101 → 05501-32-102)**
Refer to Fig. 1 for the location.

② **Reducing number of turns of L8 and L9 by one turn.**
(L8: 12.5T → 11.5T, L9: 19.5T → 18.5T)
See the next page.

③ **Change of resistance values of R5 and R8.**
(10K ohms → 3.3 K ohms)
Refer to Fig. 1 for the locations.

NOTE: If there is a black label (●) at the bottom of the Antenna Coupler (near the earth clamp), the above modifications have been already done at factory.

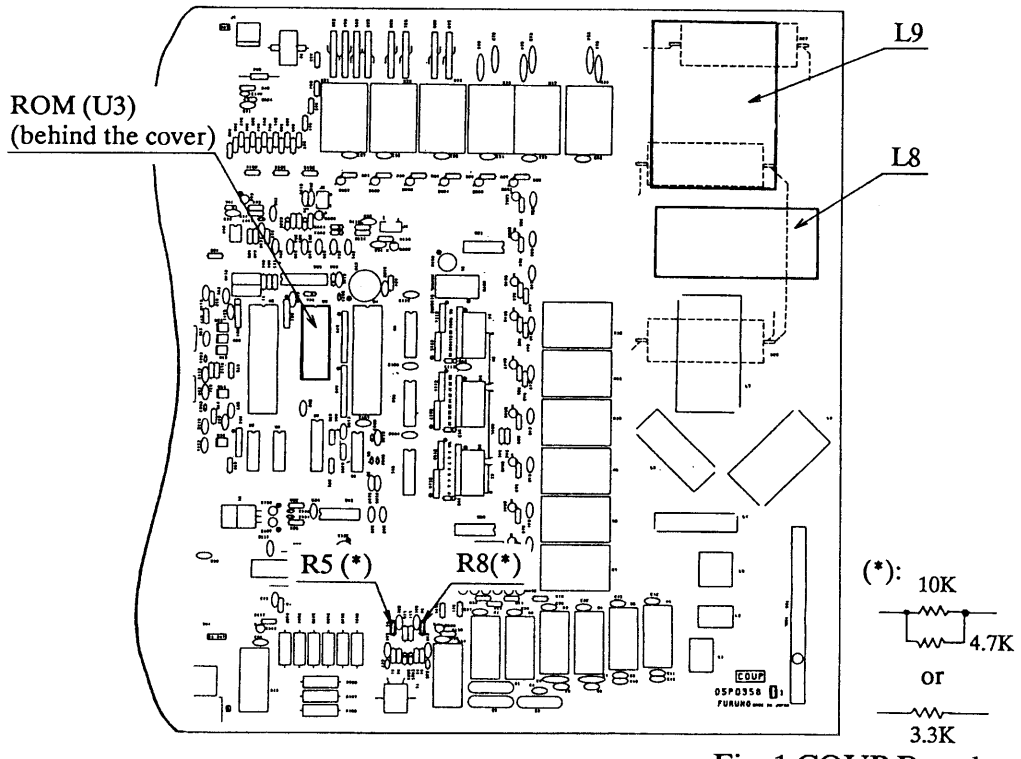
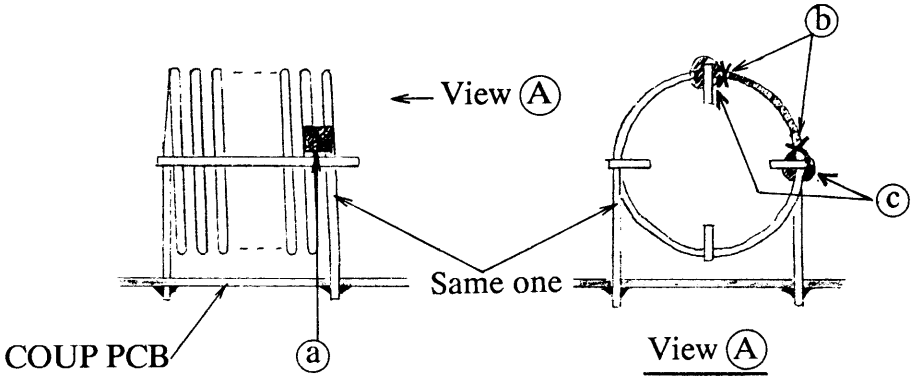


Fig. 1 COUP Board

Reducing number of turns (L8/L9)



Procedure

1. Solder ⓐ to shortcircuit the two cores.
2. Cut the two points ⓑ to remove 1/4 turns of a core.
3. Apply silicone sealant (supplied) to ⓒ to secure remaining cores.

2. Burned-out COUP board (occurred on MF band)

Factory-modified Units:

Modification	FS-5000	FS-8000
① ②	2508-0095, 0096, 0105 and after	2522-0013 and after
③	2508-0070, 0071, 0072, 0074, 0077, 0078, 0080 and after	from first set
④	2508-0109, 0111, 0114 and after	2522-0017 and after

If the length of the antenna is proper (antenna impedance: 5 ohms, 200 pF or high) and no abnormality is found on the COUP board by voice test, omit this modification.

Modifications

NOTE: If there is a black label (●) at the bottom of the Antenna Coupler (near the earth clamp), the above modifications have been already done at factory.

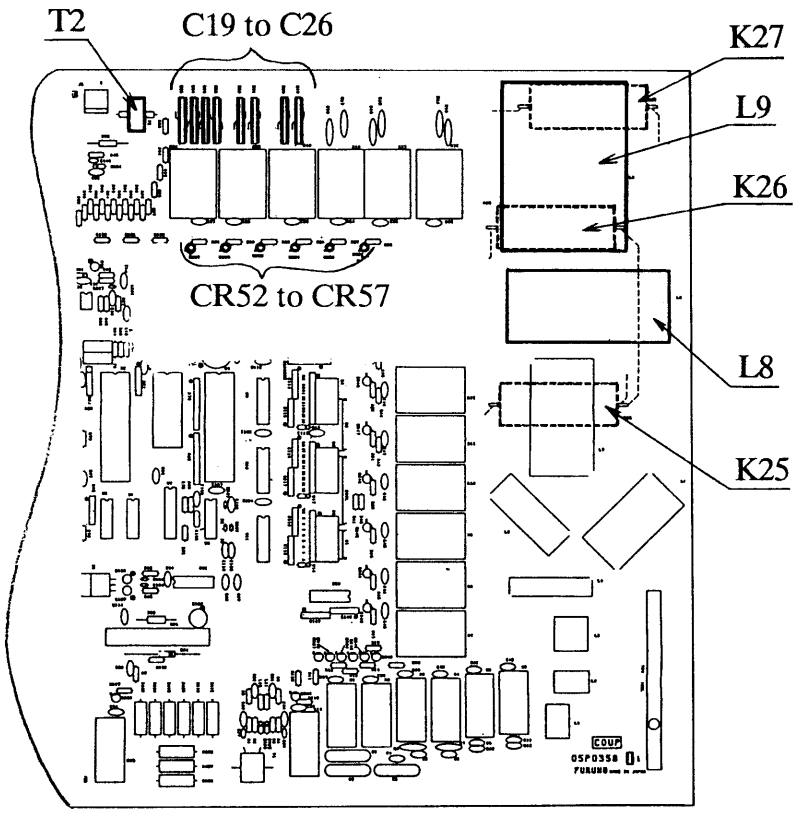


Fig. 2 COUP Board

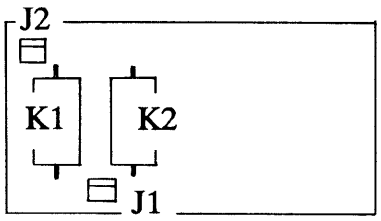
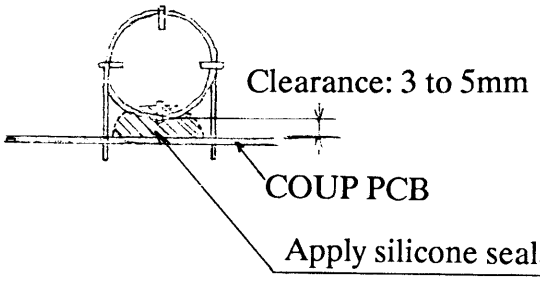
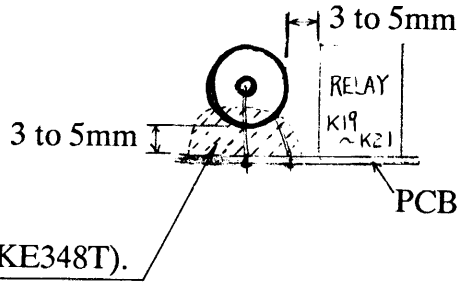


Fig. 3 DUMMY LOAD Board

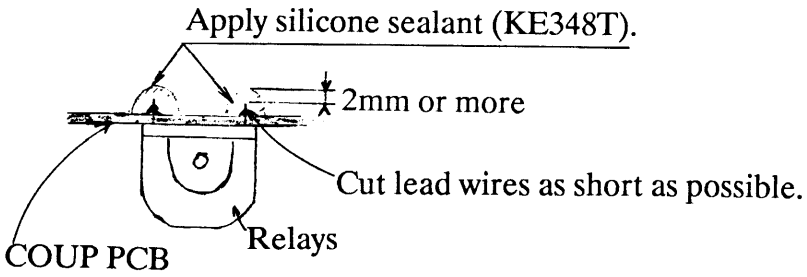
① Coils L8 and L9



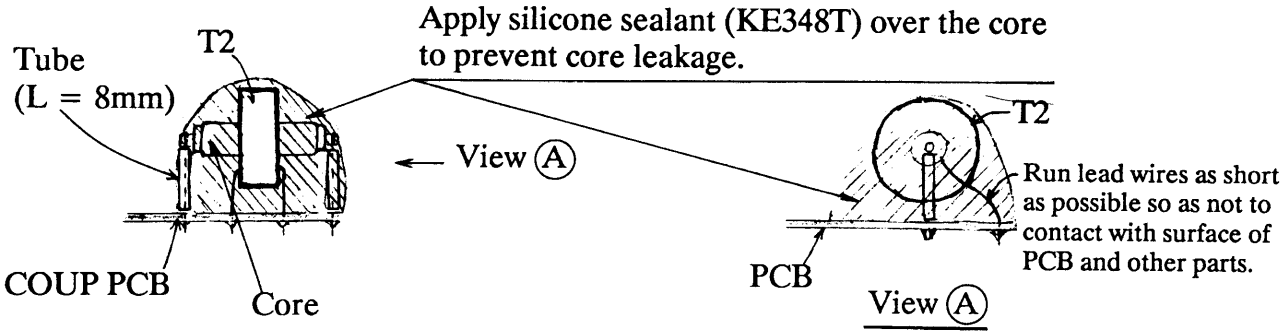
Capacitors C19 to C26

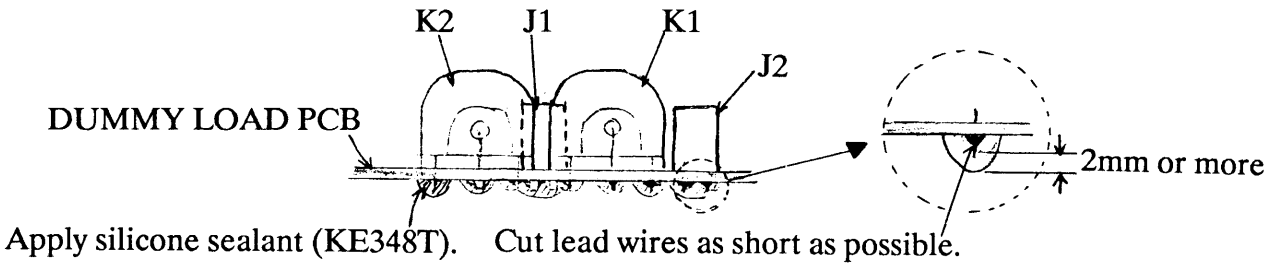


② Relays K25 to K27 (Soldering Side)



Transformer T2





③ Mounting arrester fixing metal

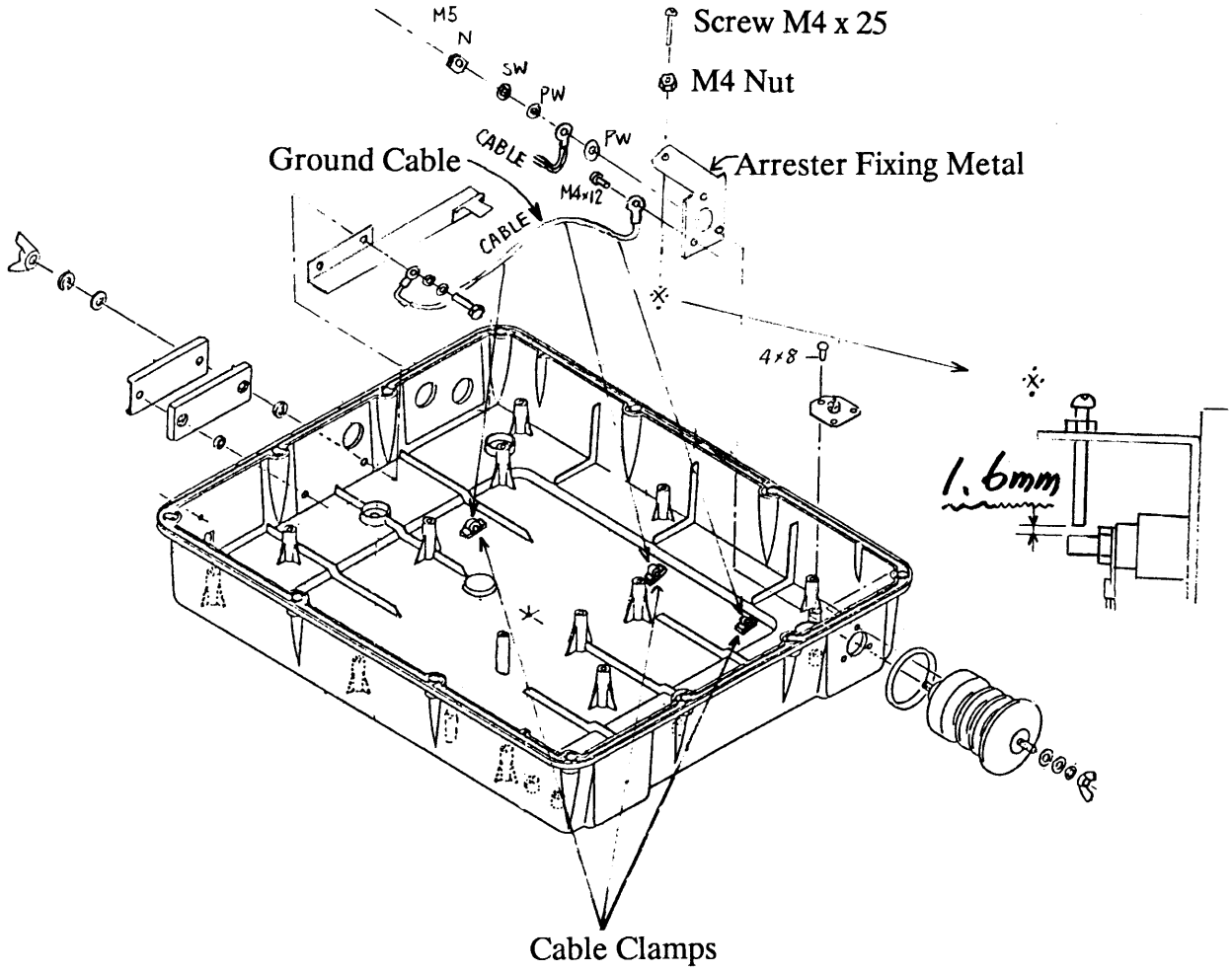


Fig. 4 Antenna Coupler

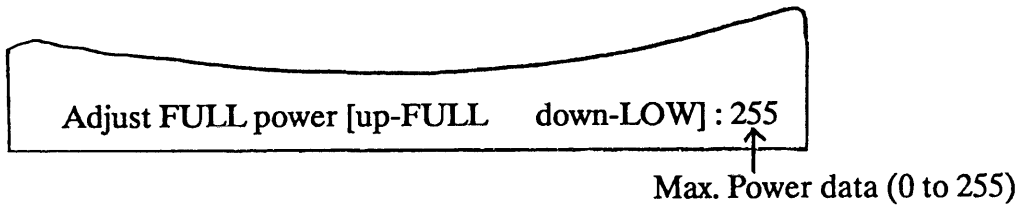
④ Power reduction on 2.5 MHz or lower

Reduce power data to 225 for the FS-5000, 160 for the FS-8000. (About 320 Wpep at transceiver unit).

Channel	Resolution of Memory
User channel	Each channel
Free direct key-in ITU channel	500 kHz steps. That is, reduce the power for two frequencies. (One frequency between 1606.5 and 1999.9 kHz. The other frequency between 2000.0 and 2499.9 kHz.)

Procedure

1. Press the **STO** key followed by the **FULL** key. The screen should look something like this:



2. Press and hold down the **LOW** key until the "power data" is 225 for the FS-5000 or 160 for the FS-8000.

3. Press the **ENT** key to memorize the power data.

⑤ Spark check

After completing of items ① to ④, check for sparking.

Procedure

1. Set the TX frequency to the lowest one in use. (ex. 1632.5 kHz)
2. Press the **TX TUNE** key.
3. Observe the LEDs CR52 to CR57 (Fig. 2). Are they all OFF?
4. If they are not off, increase the TX frequency, then press the **TX TUNE** key to check the LEDs. Repeat this procedure until CR52 to CR57 are off.
5. Communicate with the handset (voice).
6. Check for sparking at the arrester.
7. It there is sparking (due to insufficient antenna capacity), do either remedy (1) or remedy (2).

Remedy (1): Reduce the power data until there is no sparking.

Remedy (2): Mount the provided antenna capacitor (for shunting, 50 pF or 100 pF) on the DUMMY LOAD board between the antenna terminal and ground. Further, modify this board to enable control of capacitor on and off. See the next page for these modifications.

Modification of DUMMY LOAD board

(installation of antenna capacitor)

This modification enables the antenna capacitor to be turned on in the specific range set by the system settings 9924 and 9925.

Procedure

1. Prepare optional DUMMY LOAD board (code no. 005-925-830).
2. Remove K1, C1 – C2 and R1 – R3.
3. Drill fixing hole for antenna capacitor. See Fig. 5.
4. Add a jumper wire as shown below to make shortcircuit between J1 and J2.

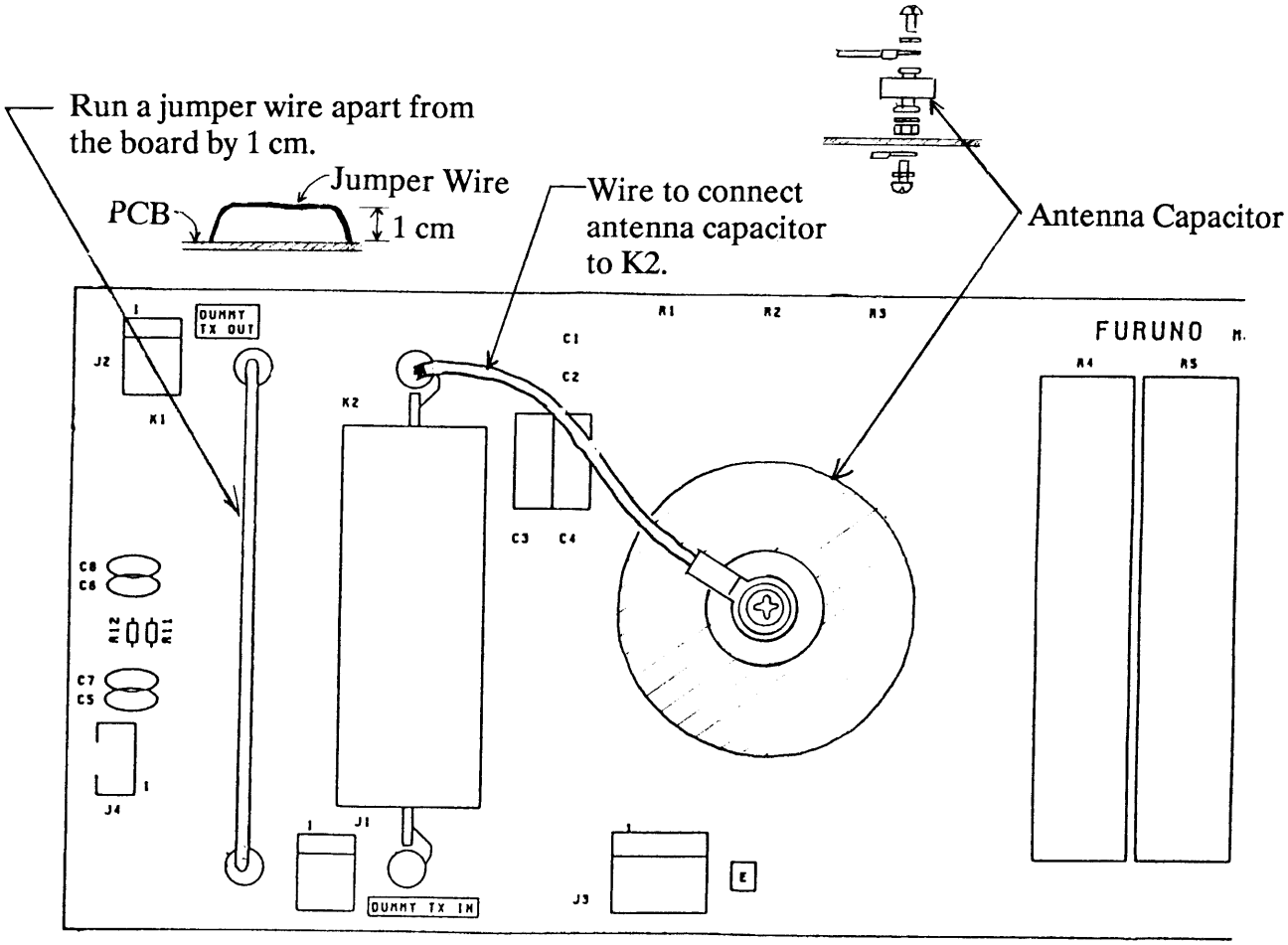


Fig. 5 DUMMY LOAD Board (Parts Side)

5. Referring to Fig. 5, fix antenna capacitor to board.

6. Solder a lug (supplied) to the earth pattern on the board.

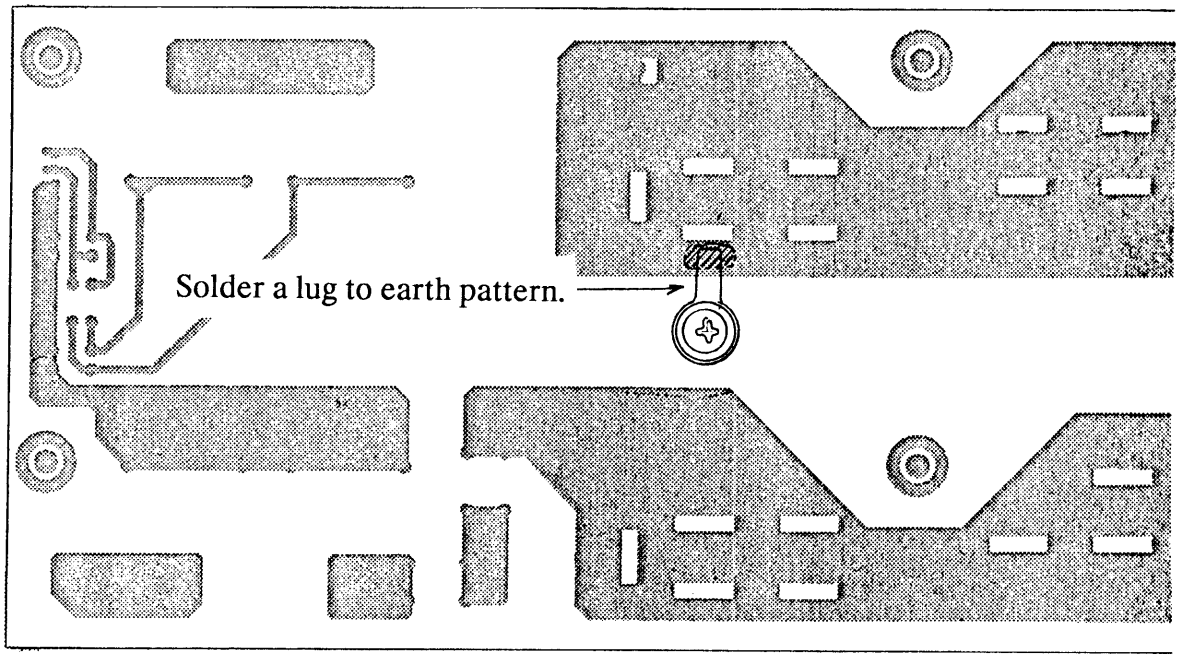
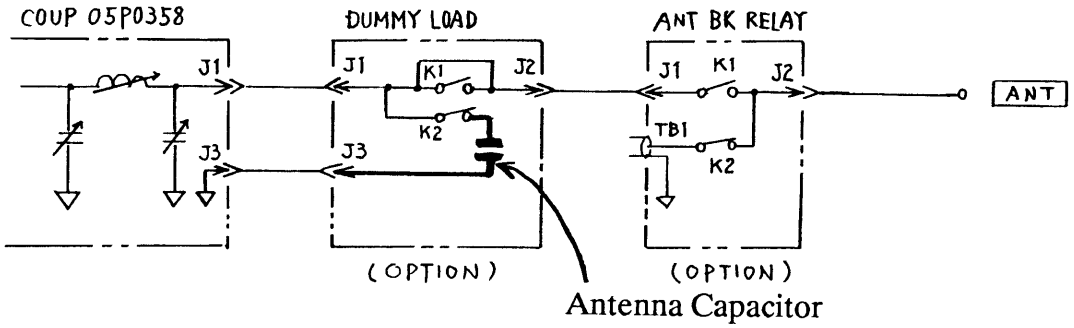


Fig. 6 DUMMY LOAD Board (Soldering Side)

7. Apply silicone sealant (KE348T) to lead wires of J1, J2 and K2 to prevent leakage of high voltage.

8. Install the DUMMY LOAD board to the Antenna Coupler.

9. Be sure wiring does not contact other wirings and parts.



10. Change the system settings through keyboard.

① **STO** → 9923 → **ENT** → 2 → **ENT**

② **STO** → 9924 → **ENT** → 1606.5 → **ENT**
(Lower limit)

③ **STO** → 9925 → **ENT** → 2500.0 → **ENT**
(Upper Limit)

Frequency range in which antenna capacitor turns on.

11. Confirm that the LCD displays "S. CAP" when the frequency within the range set by 9924 and 9925 is used. Further, check that the **DUMMY** key turns the antenna capacitor on and off.

Note: The DUMMY LOAD board nullifies the dummy load function. If the dummy load is required, install an external dummy load.

3. Burned-out PA board over 22 MHz (Modification on PA board)

Continuous transmission for about 2 minutes at full power by single tone may damage the PA board.

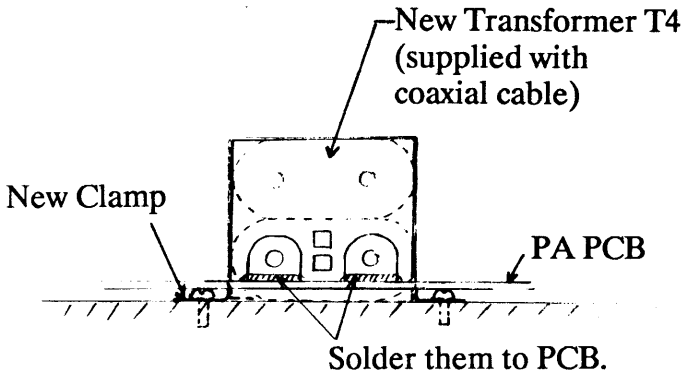
Factory-modified Units:

FS-5000	FS-8000
2508-0071, 0073, 0074, 0078 and after	2522-0016 and after

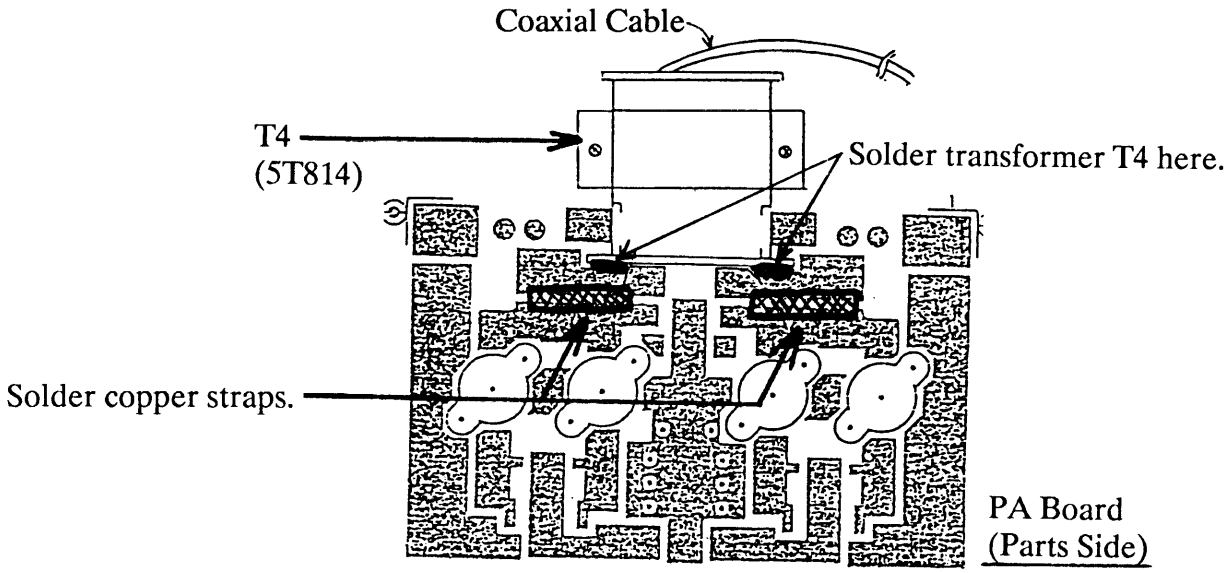
Modifications:

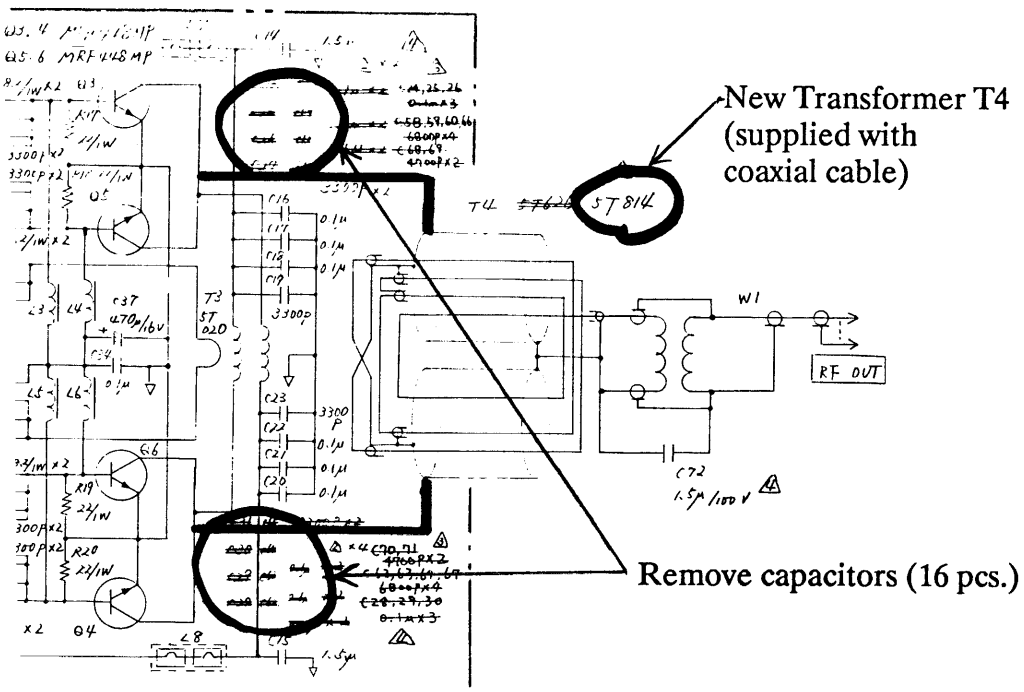
① **Replacement of transformer T4 (5T626 → 5T814)**

Double-mounted transformer



② Removal of capacitors (16 pcs.) in hatched portions and soldering copper straps there.





FURUNO
Information

NO. : FQ5-91-009
Date : 1991 - 8
Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 2 to Service Manual of FS-5000 Series SM-E5519

FS-5000/8000
Adjustment of Operating Temperature of Fan Motors

A potentiometer (R48) has been added on the PA board to enable adjustment of the operating temperature of fan motors, from the production in July 1991. In addition, the resistance value of R27 on the PA CHECK board has been changed to 1k ohms. When you replace previous versions of the PA board or the PA CHECK board, do the following adjustment.

1. Replacement of previous PA board with current PA board

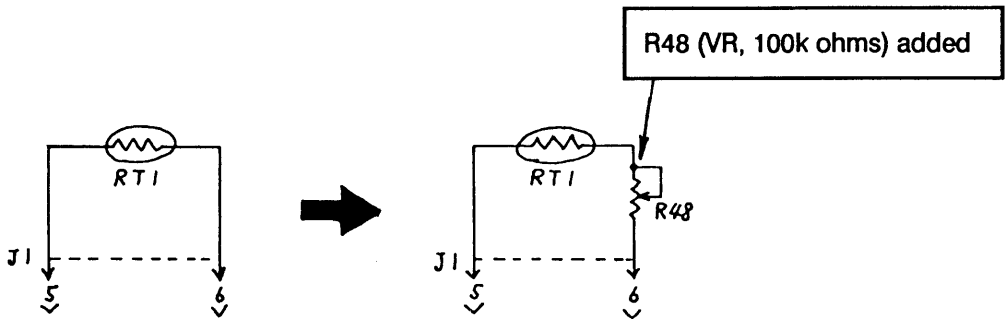
Procedure

(1) Change resistance value of R27 on the PA CHECK board to 1k ohms.
(2) Turn on the unit and measure the temperature of the heat sink with a thermometer. Confirm that the measured temperature is nearly the same as the temperature indication on the LCD (25 °C to 35 °C). If it is not, adjust R48 on the PA board.

2. Replacement of previous PA CHECK board with current PA CHECK board

Procedure

(1) Change resistance value of R27 on the PA CHECK board to 1k ohms.
(2) Turn on the unit and measure the temperature of the heat sink with a thermometer . Confirm that the measured temperature is nearly the same as the temperature indication on the LCD (25 °C to 35 °C). If it is not, change resistance value of R27 so they agree, or add R48 on the PA board and adjust it.



FURUNO
Information

NO. : FQ5-91-010
Date : 1991 - 8
Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 3 to Service Manual of FS-5000 Series SM-E5519

FS-5000/8000
New EXC PCB and REG Assy.

The above units are equipped with a new EXC board and new REG assy. (incl. REG, REG CONT and REG SW boards). These new boards are not compatible with their previous versions.

1. EXC Board

	Type	Code No.
Previous	05P0349	005-594-240
	05P0349A	005-931-840
Current	05P0349-Z	005-943-070
	05P0349A-Z	005-943-100

Not compatible

Note : Suffix A represents FS-8000.

(1) Contents of Modification: Reference Oscillator section is deleted from previous EXC board. The REF OSC board (05P0414) is newly added.

(2) Factory Modification:

Model	Serial No.
FS-5000	2508-0114 to 0137, 0139 and after
FS-8000	2522-0017 and after

2. REG Assy.

		Name	Code No.
Not compatible	Previous	REG Assy.(24V)	005-942-450
		REG Assy.(32V)	005-931-830
	Current	REG Assy.(24V)-Z...(Note 2)	005-943-040
		REG Assy.(32V)-Z...(Note 2)	005-943-050

Note 1. Current REG, REG CONT and REG SW boards are not compatible with previous ones, respectively.

2. REG assy. having version no. 3 on each of its boards represents current REG assy.

(1) Contents of Modification: Quantity (8pcs. →6pcs.) and fixing position of FETs on the REG SW board are changed. In addition, the shape of heat sink has been changed.

(2) Factory Modification: Production in July 1991 and after.

FURUNO

Information

NO. : FQ5-91-011 1/2

Date : 1991 - 8

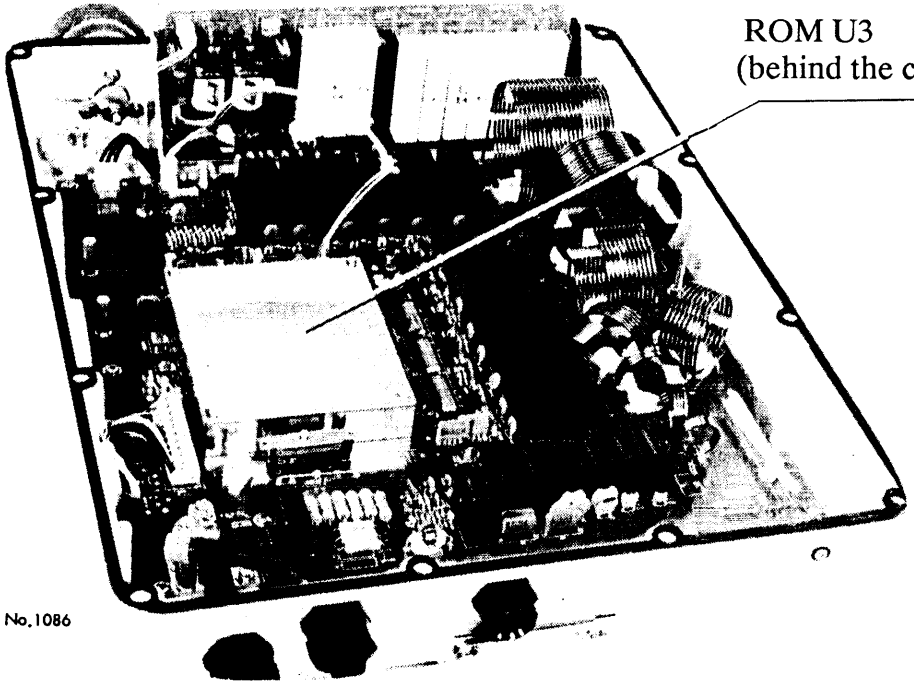
Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 4 to Service Manual of FS-5000 Series SM-E5519

FS-5000/8000
Program of ROM in Antenna Coupler Changed

The program of the ROM U3 on the COUP board in the Antenna Coupler has been changed, from version no. 2 to 3.

	Type	Code No.	S/No.
ROM	PROM05-501-32-103	592-743-000	FS-5000: 2508-0154 and after FS-8000: 2522-0017 and after



T Photo No.1086

COUP Board

Reason for Modification

Automatic tuning sequence has been changed to allow use of the pi-network on 1.6 to 3.4 MHz, because these frequencies cannot be tuned on some long wire antenna installations.

Tuning Method

Automatic Tuning (3 times)

Band (MHz)	First		Second		Third		At retuning
	Network	SWR	Network	SWR	Network	SWR	SWR
Less than 2.56	Gamma	≦3.0	Gamma	≦3.0	Pi	≦3.0	≦2.0
2.56 to 3.36	Gamma	≦2.0	Gamma	≦2.0	Pi	≦2.0	≦2.0
3.36 to 5.12	Gamma	≦2.0	Pi	≦2.0			≦2.0
5.12 to 10.24	Pi	≦2.0	Gamma	≦2.0			≦2.0
More than 10.24	Pi	≦2.0	Pi	≦2.0			≦2.0

Newly added

FURUNO
Information

NO. : FQ5-91-012
Date : 1991 - 8
Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 5 to Service Manual of FS-5000 Series SM-E5519

FS-1600/2500/5000/8000
Code No. Lists of Current PCBs & Assemblies

1. New REG Assy. added

	Name	Code No.	Remarks
Previous	REG Assy. (24V)	005-942-450	FOR 24VDC
	REG Assy. (32V)	005-931-830	FOR 32VDC
Current (*1)	REG Assy. (24V)-Z	005-943-040	FOR 24VDC
	REG Assy. (32V)-Z	005-943-050	FOR 32VDC

Quantity and fixing position of FETs are changed.

(*1) : Current REG assy. which consists of new REG/REG CONT/REG SW boards has a suffix Z or version no. 3 on its boards. If current REG assy. is used, use current PA PCB assy. shown in the list below, since current REG assy. can be combined with only new heat sink of PA PCB assy.

2. New PA PCB assy. (PA PCB plus heat sink) added

	Name	Code No.
Previous	PA PCB Assy.	005-941-810
Current (*2)	PA PCB Assy. (New)	005-943-060

Heat sinks of previous and current ones are different.

(*2) : New heat sink for current REG assy. is included.

3. PA/REG Assy. (New REG assy. plus New PA PCB assy. plus PA CHECK PCB) added

Power Supply	Name	Code No.
24VDC	PA/REG Assy.(24V)	005-943-020
32VDC	PA/REG Assy.(32V)	005-943-030

4. New EXC PCB added

EXC PCB	FS-5000		FS-8000		
	Type	Code No.	Type	Code No.	
Previous	05P0349	005-594-240	05P0349A	005-931-840	} Not compatible
Current	05P0349-Z	005-943-070	05P0349A-Z	005-943-100	

5. REF OSC PCB added ... 05P0414 (Code No. : 005-943-080)

6. INTERFACE PCB

Power Supply	FS-5000/8000		FS-8000	
	Type	Code No.	Type	Code No.
24VDC	05P0354	005-927-250	05P0362	005-594-990
32VDC	05P0354A	005-943-090	05P0362A	005-943-120

7. TX FIL PCB

FS-5000		FS-8000	
Type	Code No.	Type	Code No.
05P0350	005-927-240	05P0350A	005-943-110

8. UNBALANCE DET PCB (only for FS-8000)... 05P0437 (Code No. : 005-943-130)

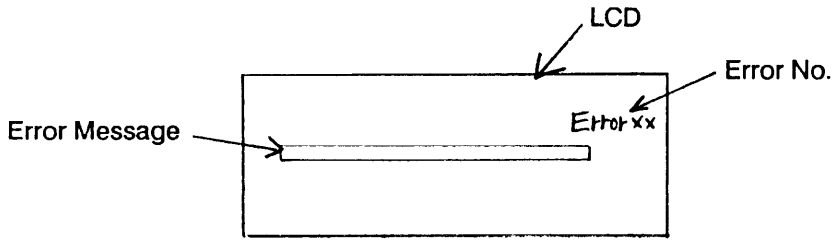
9. SWR PICK UP PCB (only for FS-8000)... 05P0413 (Code No. : 005-595-010)

Note : Maintenance Parts List for Optional Supply

Name	Code No.
ANT BK RELAY PCB	005-594-710
CONTROLLER SW PCB	005-594-730
Dummy Load Assy.	005-927-610

ERROR MESSAGE LIST FOR SELF-TEST

If one of error messages listed below appears at self-test, check the corresponding parts.



Test No.	Error No.	Error Message	Check Point
9915/9916	1	CPU/Communication error	CPU board (in the transceiver unit) or Interconnection cable
9924/9925	1	CPU/Communication error	CPU board (in the control unit) or Inter-connection cable
9923	2	No Tx AF signal on AF PCB	AF board
	3	No Rx AF sig. on AF PCB or TRx unit	
	4	No SQ AF signal on AF PCB	
	5	SQ not open on AF PCB	
	6	SQ not closed on AF PCB	
9913	7	Unlock freq.xxxx.xx kHz on RX PCB	RX board
9911	8	Unlock freq. xxxx.xx kHz on EXC PCB	EXC board
9914	9	No Rx signal through BPF on RX PCB	RX board
	10	No Rx signal through Pre-sel on RX PCB	
	11	No Rx signal on RX PCB	
	12	No S signal on RX PCB	
	13	Unable to control sensitivity on RX	
	14	Unable to mute Rx on RX PCB	

Continued

Test No.	Error No.	Error Message	Check Point
9912	15	No Mic signal from Control Unit on EXC	AF board, EXC board or Interconnection cable
	16	No Tx signal on EXC PCB	EXC board
	17	Unwanted Tx signal on EXC PCB	
	18	Insufficient source voltage	REG Unit (+18V line voltage)
	19	Insufficient PA Vc	REG Unit (+45V line voltage)
	20	Excessive PA idle current	PA board
	21	High temperature on PA	Temperature at PA board exceeds 80 °C.
	26	Unwanted Tx signal on PA or TX FIL PCB	PA board or TX FIL board
	29	No Tx signal on PA or TX FIL PCB	PA board, TX FIL board or Interconnection cable
9930	32	No acknowledge signal from Coupler	COUP board
	33	No Tx signal on PA	PA board
	35	No Tx signal on TX FIL PCB	TX FIL board

FURUNO
Information

NO. : FQ5-91-014
Date : 1991 - 9
Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 7 to Service Manual of FS-5000 SM-E5519

FS-5000/8000
ROM PROGRAM CHANGE (Ver. 7)

ROMs on the Control and Transceiver Units have been changed from "6" to "7" from August 1991.

	Type	Code No.
NEW ROM	PROM 05-501-31-107	005-927-440

Contents of Modification

1. Receiver Functions

(1) The beep associated with the following function keys has been disabled as it has proved to be a hindrance.

[TUNE], [PRESELECTOR], [SENSITIVITY], [VOLUME]

(2) Automatic selection of duplex filter and preselector in duplex mode, depending on the RX frequency.

RX freq.	Preselector	Duplex filter
4MHz or less	ON	OFF
4 to 4.5 MHz	OFF	ON

Note that preselector status is restored to previous setting when simplex mode is selected on 4 to 4.5MHz.

(3) Speaker is automatically switched on when changing the communication mode from DUPLEX to SIMPLEX.

2. Transmitter Functions

(1) A beep(s) has been added after completion of TX TUNE operation.

OK result: "beep"
Error result: "beep-beep-beep"

(2) The time interval for detection of PA temperature has been lengthened to protect rapid power reduction due to high temperature at PA.

	Previous		Current
Interval:	2 seconds	→	5 minutes

(3) Automatic turn-off for dummy load: If TX frequency is changed with the dummy load turned ON, the dummy load will automatically be turned OFF. (For FS-8000, the DUMMY operation is inactive on the HF band.)

3. System Settings

(1) Additional system setting allowing free selection of TX frequency within marine bands; by entering the following commands:

[STO] 9901 [ENT] 3 [ENT]

Any frequency in the following bands may be transmitted.

1606.5- 4438,	18780-18900,	
6200 - 6525,	19680-19800,	
8100 - 8815,	22000-22855,	
12230 -13200,	25070-25210,	
16360 -17410,	26100-26175	(unit: kHz)

(2) System setting #9902 has been deleted.
(New ITU frequencies are now in use.)

(3) Change of setting range of #9913 (System delay time).
(10 to 99ms → 5 to 99ms)
Note that system delay time is now 10ms (minimum) even if you set #9913 for "5ms".

FURUNO

Information

NO. : FQ5-91-015

Date : 1991 - 9

Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

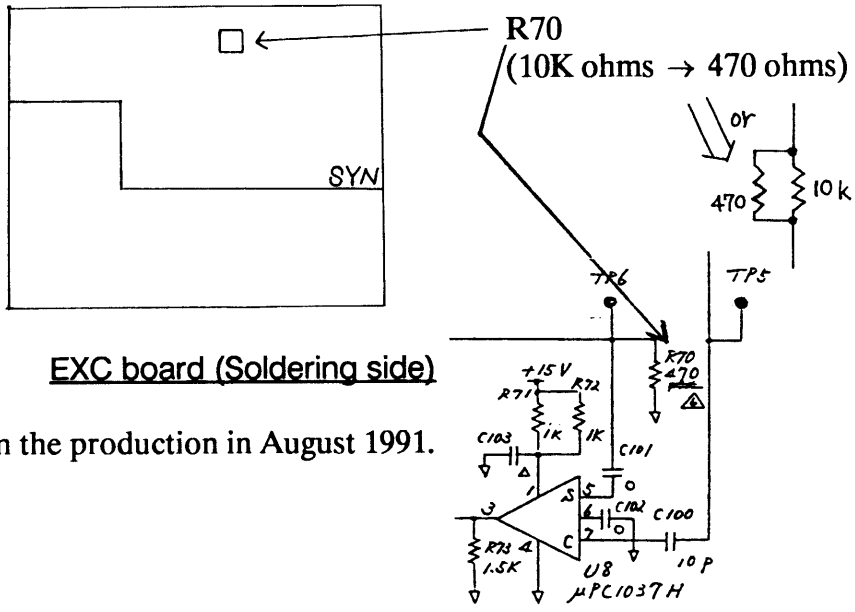
Addenda No. 8 to Service Manual of FS-5000 SM-E5519

FS-5000/8000
Remedy for TX Frequency Deviation

Symptom: You can not transmit due to synthesizer unlock, or another station can not receive your signal clearly.

Cause: 3rd local oscillation unlocks because of excessive input level of U8 (mixer) in the SYN section on the EXC board.

Remedy: Change R70 from 10K ohms to 470 ohms (Code No.: 000-117-177), or add 470 ohms in parallel with R70.
Do this remedy at next ship visit.



EXC board (Soldering side)

Factory Modification: From the production in August 1991.

Addenda No.9 to Service Manual of FS-5000 SM-E5519

FS-5000/8000
Maintenance Parts List Changed

The following shows current maintenance parts list.

MAINTENANCE PARTS LIST NO.M61900
FOR FS-5000/8000

*1:DEPOT MAINTENANCE PARTS FOR 10 SETS IN 2 YEARS
*2:SHIPBORNE RUNNING PARTS FOR 1 SET IN 2 YEARS

CODE NO.	NAME OF PARTS	TYPE	SPECIFICATIONS	QUANTITY *1	QUANTITY *2	REMARKS
000-119-440	TRANSISTOR	MRF-448MP	05S0546-1	6	2	PA PCB (2 PAIRS)
000-121-823	MOS FET	IRFP150		6	2	REG SW PCB
000-104-429	DIODE	05AZ18Z	ZENER	6	2	REG SW PCB
000-106-066	RELAY	JR1-DC12V	AJR3221	1	1	TX FIL PCB (50 OHMS BK)
000-106-068	RELAY	JC1AF-DC12V	AR321173	3	1	COUP PCB
000-106-069	RELAY	FRD-12023		3	1	COUP PCB
000-106-216	RELAY	JC2AF-DC12V	AR322173	3	1	COUP PCB
000-116-371	RELAY	HD1-M-DC12V	AG4013	1	1	RX PCB
000-119-485	RELAY	JR1A-DC12V	AJR3211	3	1	COUP PCB
000-445-356	RELAY	JH2A-DC24V AR5222		1	1	INTERFACE PCB
000-113-376	CRYSTAL	05S0402-0 49.5MHZ	05S0402-0	1	1	EXC PCB
000-119-322	FAN MOTOR	MD1225A-24		1		FOR PA COOLING
000-121-337	MOTOR	109E0824H402		1		
000-580-091	LOUDSPEAKER	EAS-65P16S	8, 2W	1		
000-112-623	HANDSET WITH CURL CORD	HS6000FZ5		1	1	
000-835-126	NI-CD BATTERY	N-50SB3		2		
005-594-140	PRINTED CIRCUIT BOARD	05P0367 PA CHECK	FS-5000T/8000T	3	1	
005-594-200	PRINTED CIRCUIT BOARD	05P0347 CPU	FS-5000T/8000T	3	1	TRANSCEIVER UNIT
005-594-220	PRINTED CIRCUIT BOARD	05P0348 RX	FS-5000T/8000T	3	1	
005-594-240	PRINTED CIRCUIT BOARD	05P0349 EXC	FS-5000T	3	1	OLD ONE. ONLY FOR FS-5000
005-594-290	PRINTED CIRCUIT BOARD	05P0358 COUPLER	AT-5000	3	1	
005-594-520	PRINTED CIRCUIT BOARD	05P0357 KEY	FS-5000C	3	1	
005-594-540	PRINTED CIRCUIT BOARD	05P0355 CPU	FS-5000C	3	1	CONTROL UNIT
005-594-560	PRINTED CIRCUIT BOARD	05P0356 AF	FS-5000C	3	1	
005-594-710	PRINTED CIRCUIT BOARD	05P0359	ANT BK RELAY	1		OPTION
005-594-730	PRINTED CIRCUIT BOARD	05P0368	CONTROLLER SW	1		OPTION
005-594-990	PRINTED CIRCUIT BOARD	05P0362 I/F 24V	FS-8000T	3	1	ONLY FOR FS-8000/24VDC
005-595-010	PRINTED CIRCUIT BOARD	05P0413 SWR PICKUP	FS-8000T	3	1	ONLY FOR FS-8000
005-927-240	PRINTED CIRCUIT BOARD	05P0350 TX FIL	FS-5000T	3	1	ONLY FOR FS-5000
005-927-250	PRINTED CIRCUIT BOARD	05P0354 I/F 24V	FS-5000T/8000T	3	1	FOR 24VDC SET
005-927-460	PRINTED CIRCUIT BOARD	LM24008M LCD	FS-5000C	3	1	
005-927-610	DUMMY LOAD PCB ASSEMBLY	05P0360	FS5000/8000	1		OPTION. W/MOUNTING PLATE
005-931-830	REG ASSEMBLY (32V)	FS-5000/8000T	REG/R CONT.P.	3	1	OLD ONE. FOR 32VDC SET
005-931-840	PRINTED CIRCUIT BOARD	05P0349A EXC	FS-8000T	3	1	OLD ONE. ONLY FOR FS-8000
005-941-810	PA PCB ASSEMBLY	05P0363 W/HEAT SINK	FS-5000T/8000T	3	1	OLD ONE
005-942-450	REG ASSEMBLY (24V)	FS-5000/8000T	REG/R CONT.P.	3	1	OLD ONE. FOR 24VDC SET
005-943-020	PA/REG ASSEMBLY (24V)	05P0363 W/REG.SHIELD	FS-5000T/8000T	1		FOR 24VDC SET
005-943-030	PA/REG ASSEMBLY (32V)	05P0363A W/REG COVER	FS-5000T/8000T	1		FOR 32VDC SET
005-943-040	REG ASSEMBLY (24V)-Z	05P0352Z/353Z/398Z	FS-5000T/8000T	3	1	NEW ONE. FOR 24VDC SET

MAINTENANCE PARTS LIST NO.M61900
FOR FS-5000/8000

CODE NO.	NAME OF PARTS	TYPE	SPECIFICATIONS	QUANTITY *1	QUANTITY *2	REMARKS
005-943-050	REG ASSEMBLY (32V)-Z	05P0352Z/353AZ/398Z	FS-5000T/8000T	3	1	NEW ONE. FOR 32VDC SET
005-943-060	PA PCB ASSEMBLY-Z	05P0363 W/HEAT SINK	FS-5000T/8000T	3	1	NEW ONE
005-943-070	PRINTED CIRCUIT BOARD	05P0349-Z EXC	FS-5000T	3	1	NEW ONE. ONLY FOR FS-5000
005-943-080	PRINTED CIRCUIT BOARD	05P0414 REF OSC	FS-5000T/8000T	3	1	
005-943-090	PRINTED CIRCUIT BOARD	05P0354A I/F	FS-5000T/8000T	3	1	FOR 32VDC SET
005-943-100	PRINTED CIRCUIT BOARD	05P0349A-Z EXC	FS-8000T	3	1	NEW ONE. ONLY FOR FS-8000
005-943-110	PRINTED CIRCUIT BOARD	05P0350A TX FIL	FS-8000T	3	1	ONLY FOR FS-8000
005-943-120	PRINTED CIRCUIT BOARD	05P0362A I/F 32V	FS-8000T	3	1	ONLY FOR FS-8000/32VDC
005-943-130	PRINTED CIRCUIT BOARD	05P0437 UNBAL DET	FS-8000T	3	1	ONLY FOR FS-8000
000-119-467	FLEXIBLE CABLE	SMCD-1.25-20-400-NBD		1	1	CONTROL UNIT

FURUNO
Information

NO. : FQ5-91-018
Date : 1991 - 10
Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 10 to Service Manual of FS-5000 SM-E5519

FS-5000/8000
New Version ROM (No. 8)

The version no. of the ROMs on the control and transceiver units have been changed from 7 to 8 in September 1991.

CONTENTS OF MODIFICATION

1. ITU Frequency Table for USA has been added. (SSB only)
.....Selectable with new system setting 9961.

Calling Procedure

① [STO] "9961" [ENT]
The following menu appears:

ITU Freq. Table [0-INT, 1-USA]

② "1" [ENT]

Details of ITU Frequency Table for USA ...Refer to attached sheet.

(1) The following channels were omitted from standard ITU Frequency Table as they are not specified by the FCC:

429-452 609-611 833-835 838-870 1238-1246 1650-1663 1816-1822
2248-2260 2511-2517

(2) Simplex channels are re-arranged to start from No. 61 as follows:

461:4146	661:6224	861:8294	1261:12353	1661:16528	1861:18840
462:4149	662:6227	862:8297	1262:12356	1662:16531	1862:18843
463:4417	663:6230		1263:12359	1663:16534	
	664:6516				

2261:22159	2561:25115
2262:22162	2562:25118
2263:22165	
2264:22168	
2265:22171	

(3) Mississippi River channels are re-arranged to start from No. 71 as follows:

471:4065	671:6209	871:8201	1271:12362	1671:16543
472:4089	672:6212	872:8213	1272:12365	1672:16546
473:4116	673:6510	873:8725		
474:4408	674:6513	874:8737		

(4) Alaska Radio channels are re-arranged to start from No. 81 as follows:

481:4366
482:4369
483:4396
484:4402
485:4420
486:4423

(5) Transmission frequencies of three duplex channels have been changed as follows:

	Previous T-R	Current T-R
428:	4351-4351	4060-4351
836:	8713-8713	8113-8713
837:	8716-8716	8128-8716

(6) Distress channel numbers are re-arranged so that they all end with a zero.

300:3023
400:4125
500:5680
600:6215
800:8291
1200:12290
1600:16420

2. In standard ITU Frequency Table, distress channel numbers are re-arranged as follows:

300:3023
400:4125
500:5680
600:6215
800:8291
1200:12290
1600:16420

3. 5680 kHz has been added to the "Marine Band" ("9901") Table.

4. GMDSS Frequency changes ... (Calling Procedure: **[DSC]** "Channel No." **[ENT]**)

Ch. No.	Frequency	Remarks
7	500	moved from CH10
8	3023	added (SSB)
9	5680	added (SSB)
51	T2189.5-R2177	corrected (Telex)
52	T2177-R2177	corrected (Telex)

5. High temperature threshold of thermal protection circuit on PA section has been changed fro 80°C to 90°C.

6. Software bug amended: Tuning was sometimes done twice.

FACTORY MODIFICATION

Model	Serial Number
FS-5000	2508-0223 to 0227, 0232 and after
FS-8000	2522-0019 and after

ROM CODE NUMBER

Type	Code No.
PROM 05-501-31-108	005-927-440

FURUNO

USA SSB FREQUENCY TABLE FOR FURUNO SSB RADIOTELEPHONES

1			2			3			4			5			6			Remarks
4 MHz BAND			6 MHz BAND			8 MHz BAND			12 MHz BAND			16 MHz BAND			18/19 MHz BAND			22 MHz BAND			25/26 MHz BAND			
No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	
300	3023	3023	600	6215	6215	800	8291	8291	1200	12290	12290	1600	16420	16420										Distress Channels
400	4125	4125																						
500	5680	5680																						
401	4065	4357	601	6200	6501	801	8195	8719	1201	12230	13077	1601	16360	17242	1801	18780	19755	2201	22000	22696	2501	25070	26145	ITU SSB Duplex Channels
402	4068	4360	602	6203	6504	802	8198	8722	1202	12233	13080	1602	16363	17245	1802	18783	19758	2202	22003	22699	2502	25073	26148	
403	4071	4363	603	6206	6507	803	8201	8725	1203	12236	13083	1603	16366	17248	1803	18786	19761	2203	22006	22702	2503	25076	26151	
404	4074	4366	604	6209	6510	804	8204	8728	1204	12239	13086	1604	16369	17251	1804	18789	19764	2204	22009	22705	2504	25079	26154	
405	4077	4369	605	6212	6513	805	8207	8731	1205	12242	13089	1605	16372	17254	1805	18792	19767	2205	22012	22708	2505	25082	26157	
406	4080	4372	606	6215	6516	806	8210	8734	1206	12245	13092	1606	16375	17257	1806	18795	19770	2206	22015	22711	2506	25085	26160	
407	4083	4375	607	6218	6519	807	8213	8737	1207	12248	13095	1607	16378	17260	1807	18798	19773	2207	22018	22714	2507	25088	26163	
408	4086	4378	608	6221	6522	808	8216	8740	1208	12251	13098	1608	16381	17263	1808	18801	19776	2208	22021	22717	2508	25091	26166	
409	4089	4381				809	8219	8743	1209	12254	13101	1609	16384	17266	1809	18804	19779	2209	22024	22720	2509	25094	26169	
410	4092	4384				810	8222	8746	1210	12257	13104	1610	16387	17269	1810	18807	19782	2210	22027	22723	2510	25097	26172	
411	4095	4387				811	8225	8749	1211	12260	13107	1611	16390	17272	1811	18810	19785	2211	22030	22726				
412	4098	4390				812	8228	8752	1212	12263	13110	1612	16393	17275	1812	18813	19788	2212	22033	22729				
413	4101	4393				813	8231	8755	1213	12266	13113	1613	16396	17278	1813	18816	19791	2213	22036	22732				
414	4104	4396				814	8234	8758	1214	12269	13116	1614	16399	17281	1814	18819	19794	2214	22039	22735				
415	4107	4399				815	8237	8761	1215	12272	13119	1615	16402	17284	1815	18822	19797	2215	22042	22738				
416	4110	4402				816	8240	8764	1216	12275	13122	1616	16405	17287				2216	22045	22741				
417	4113	4405				817	8243	8767	1217	12278	13125	1617	16408	17290				2217	22048	22744				
418	4116	4408				818	8246	8770	1218	12281	13128	1618	16411	17293				2218	22051	22747				
419	4119	4411				819	8249	8773	1219	12284	13131	1619	16414	17296				2219	22054	22750				
420	4122	4414				820	8252	8776	1220	12287	13134	1620	16417	17299				2220	22057	22753				
421	4125	4417				821	8255	8779	1221	12290	13137	1621	16420	17302				2221	22060	22756				
422	4128	4420				822	8258	8782	1222	12293	13140	1622	16423	17305				2222	22063	22759				
423	4131	4423				823	8261	8785	1223	12296	13143	1623	16426	17308				2223	22066	22762				
424	4134	4426				824	8264	8788	1224	12299	13146	1624	16429	17311				2224	22069	22765				
425	4137	4429				825	8267	8791	1225	12302	13149	1625	16432	17314				2225	22072	22768				
426	4140	4432				826	8270	8794	1226	12305	13152	1626	16435	17317				2226	22075	22771				
427	4143	4435				827	8273	8797	1227	12308	13155	1627	16438	17320				2227	22078	22774				
428	4060	4351				828	8276	8800	1228	12311	13158	1628	16441	17323				2228	22081	22777				
						829	8279	8803	1229	12314	13161	1629	16444	17326				2229	22084	22780				
						830	8282	8806	1230	12317	13164	1630	16447	17329				2230	22087	22783				
						831	8285	8809	1231	12320	13167	1631	16450	17332				2231	22090	22786				
						832	8288	8812	1232	12323	13170	1632	16453	17335				2232	22093	22789				
									1233	12326	13173	1633	16456	17338				2233	22096	22792				
									1234	12329	13176	1634	16459	17341				2234	22099	22795				
									1235	12332	13179	1635	16462	17344				2235	22102	22798				
						836	8113	8713	1236	12335	13182	1636	16465	17347				2236	22105	22801				
						837	8128	8716	1237	12338	13185	1637	16468	17350				2237	22108	22804				
												1638	16471	17353				2238	22111	22807				
												1639	16474	17356				2239	22114	22810				
												1640	16477	17359				2240	22117	22813				
												1641	16480	17362				2241	22120	22816				
												1642	16483	17365				2242	22123	22819				
												1643	16486	17368				2243	22126	22822				
												1644	16489	17371				2244	22129	22825				
												1645	16492	17374				2245	22132	22828				
												1646	16495	17377				2246	22135	22831				
												1647	16498	17380				2247	22138	22834				
												1648	16501	17383										
												1649	16504	17386										
461	4146	4146	661	6224	6224	861	8294	8294	1261	12353	12353	1661	16528	16528	1861	18840	18840	2261	22159	22159	2561	25115	25115	Simplex Channels
462	4149	4149	662	6227	6227	862	8297	8297	1262	12356	12356	1662	16531	16531	1862	18843	18843	2262	22162	22162	2562	25118	25118	
463	4417	4417	663	6230	6230				1263	12359	12359	1663	16534	16534				2263	22165	22165				
			664	6516	6516													2264	22168	22168				
																		2265	22171	22171				
471	4065	4065	671	6209	6209	871	8201	8201	1271	12362	12362	1671	16543	16543										Mississippi River Channels
472	4089	4089	672	6212	6212	872	8213	8213	1272	12365	12365	1672	16546	16546										
473	4116	4116	673	6510	6510	873	8725	8725																
474	4408	4408	674	6513	6513	874	8737	8737																
481	4366	4366																						Alaska Radio Channels
482	4369	4369																						
483	4396	4396																						
484	4402	4402																						
485	4420	4420																						
486	4423	4423																						

A B C D

FURUNO

ITU SSB FREQUENCY TABLE FOR FURUNO SSB RADIOTELEPHONES

1991/10 ITUSSB 5/5

1			2			3			4			5			6					
4 MHz BAND			6 MHz BAND			8 MHz BAND			12 MHz BAND			16 MHz BAND			18/19 MHz BAND			22 MHz BAND			25/26 MHz BAND		
No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX
300	3023	3023	600	6215	6215	800	8291	8291	1200	12290	12290	1600	16420	16420									
400	4125	4125																					
500	5680	5680																					
401	4065	4357	601	6200	6501	801	8195	8719	1201	12230	13077	1601	16360	17242	1801	18780	19755	2201	22000	22696	2501	25070	26145
402	4068	4360	602	6203	6504	802	8198	8722	1202	12233	13080	1602	16363	17245	1802	18783	19758	2202	22003	22699	2502	25073	26148
403	4071	4363	603	6206	6507	803	8201	8725	1203	12236	13083	1603	16366	17248	1803	18786	19761	2203	22006	22702	2503	25076	26151
404	4074	4366	604	6209	6510	804	8204	8728	1204	12239	13086	1604	16369	17251	1804	18789	19764	2204	22009	22705	2504	25079	26154
405	4077	4369	605	6212	6513	805	8207	8731	1205	12242	13089	1605	16372	17254	1805	18792	19767	2205	22012	22708	2505	25082	26157
406	4080	4372	606	6215	6516	806	8210	8734	1206	12245	13092	1606	16375	17257	1806	18795	19770	2206	22015	22711	2506	25085	26160
407	4083	4375	607	6218	6519	807	8213	8737	1207	12248	13095	1607	16378	17260	1807	18798	19773	2207	22018	22714	2507	25088	26163
408	4086	4378	608	6221	6522	808	8216	8740	1208	12251	13098	1608	16381	17263	1808	18801	19776	2208	22021	22717	2508	25091	26166
409	4089	4381	609	6224	6224	809	8219	8743	1209	12254	13101	1609	16384	17266	1809	18804	19779	2209	22024	22720	2509	25094	26169
410	4092	4384	610	6227	6227	810	8222	8746	1210	12257	13104	1610	16387	17269	1810	18807	19782	2210	22027	22723	2510	25097	26172
411	4095	4387	611	6230	6230	811	8225	8749	1211	12260	13107	1611	16390	17272	1811	18810	19785	2211	22030	22726	2511	25100	25100
412	4098	4390				812	8228	8752	1212	12263	13110	1612	16393	17275	1812	18813	19788	2212	22033	22729	2512	25103	25103
413	4101	4393				813	8231	8755	1213	12266	13113	1613	16396	17278	1813	18816	19791	2213	22036	22732	2513	25106	25106
414	4104	4396				814	8234	8758	1214	12269	13116	1614	16399	17281	1814	18819	19794	2214	22039	22735	2514	25109	25109
415	4107	4399				815	8237	8761	1215	12272	13119	1615	16402	17284	1815	18822	19797	2215	22042	22738	2515	25112	25112
416	4110	4402				816	8240	8764	1216	12275	13122	1616	16405	17287	1816	18825	18825	2216	22045	22741	2516	25115	25115
417	4113	4405				817	8243	8767	1217	12278	13125	1617	16408	17290	1817	18828	18828	2217	22048	22744	2517	25118	25118
418	4116	4408				818	8246	8770	1218	12281	13128	1618	16411	17293	1818	18831	18831	2218	22051	22747			
419	4119	4411				819	8249	8773	1219	12284	13131	1619	16414	17296	1819	18834	18834	2219	22054	22750			
420	4122	4414				820	8252	8776	1220	12287	13134	1620	16417	17299	1820	18837	18837	2220	22057	22753			
421	4125	4417				821	8255	8779	1221	12290	13137	1621	16420	17302	1821	18840	18840	2221	22060	22756			
422	4128	4420				822	8258	8782	1222	12293	13140	1622	16423	17305	1822	18843	18843	2222	22063	22759			
423	4131	4423				823	8261	8785	1223	12296	13143	1623	16426	17308				2223	22066	22762			
424	4134	4426				824	8264	8788	1224	12299	13146	1624	16429	17311				2224	22069	22765			
425	4137	4429				825	8267	8791	1225	12302	13149	1625	16432	17314				2225	22072	22768			
426	4140	4432				826	8270	8794	1226	12305	13152	1626	16435	17317				2226	22075	22771			
427	4143	4435				827	8273	8797	1227	12308	13155	1627	16438	17320				2227	22078	22774			
428	4351	4351				828	8276	8800	1228	12311	13158	1628	16441	17323				2228	22081	22777			
429	4354	4354				829	8279	8803	1229	12314	13161	1629	16444	17326				2229	22084	22780			
430	4146	4146				830	8282	8806	1230	12317	13164	1630	16447	17329				2230	22087	22783			
431	4149	4149				831	8285	8809	1231	12320	13167	1631	16450	17332				2231	22090	22786			
432	4000	4000				832	8288	8812	1232	12323	13170	1632	16453	17335				2232	22093	22789			
433	4003	4003				833	8291	8291	1233	12326	13173	1633	16456	17338				2233	22096	22792			
434	4006	4006				834	8707	8707	1234	12329	13176	1634	16459	17341				2234	22099	22795			
435	4009	4009				835	8710	8710	1235	12332	13179	1635	16462	17344				2235	22102	22798			
436	4012	4012				836	8713	8713	1236	12335	13182	1636	16465	17347				2236	22105	22801			
437	4015	4015				837	8716	8716	1237	12338	13185	1637	16468	17350				2237	22108	22804			
438	4018	4018				838	8294	8294	1238	12341	13188	1638	16471	17353				2238	22111	22807			
439	4021	4021				839	8297	8297	1239	12344	13191	1639	16474	17356				2239	22114	22810			
440	4024	4024				840	8101	8101	1240	12347	13194	1640	16477	17359				2240	22117	22813			
441	4027	4027				841	8104	8104	1241	12350	13197	1641	16480	17362				2241	22120	22816			
442	4030	4030				842	8107	8107	1242	12353	12353	1642	16483	17365				2242	22123	22819			
443	4033	4033				843	8110	8110	1243	12356	12356	1643	16486	17368				2243	22126	22822			
444	4036	4036				844	8113	8113	1244	12359	12359	1644	16489	17371				2244	22129	22825			
445	4039	4039				845	8116	8116	1245	12362	12362	1645	16492	17374				2245	22132	22828			
446	4042	4042				846	8119	8119	1246	12365	12365	1646	16495	17377				2246	22135	22831			
447	4045	4045				847	8122	8122				1647	16498	17380				2247	22138	22834			
448	4048	4048				848	8125	8125				1648	16501	17383				2248	22141	22837			
449	4051	4051				849	8128	8128				1649	16504	17386				2249	22144	22840			
450	4054	4054				850	8131	8131				1650	16507	17389				2250	22147	22843			
451	4057	4057				851	8134	8134				1651	16510	17392				2251	22150	22846			
452	4060	4060				852	8137	8137				1652	16513	17395				2252	22153	22849			
						853	8140	8140				1653	16516	17398				2253	22156	22852			
						854	8143	8143				1654	16519	17401				2254	22159	22159			
						855	8146	8146				1655	16522	17404				2255	22162	22162			
						856	8149	8149				1656	16525	17407				2256	22165	22165			
						857	8152	8152				1657	16528	16528				2257	22168	22168			
						858	8155	8155				1658	16531	16531				2258	22171	22171			
						859	8158	8158				1659	16534	16534				2259	22174	22174			
						860	8161	8161				1660	16537	16537				2260	22177	22177			
						861	8164	8164				1661	16540	16540									
						862	8167	8167				1662	16543	16543									
						863	8170	8170				1663	16546	16546									
						864	8173	8173															
						865	8176	8176															
						866	8179	8179															
						867	8182	8182															
						868	8185	8185															
						869	8188	8188															
						870	8191	8191															

FURUNO

Information

NO. : FQ5-91-017

Date : 1991 - 10

Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 11 to Service Manual of FS-5000 SM-E5519

①

FS-5000/8000
Photo Coupler for Telegraph Key Input Damaged

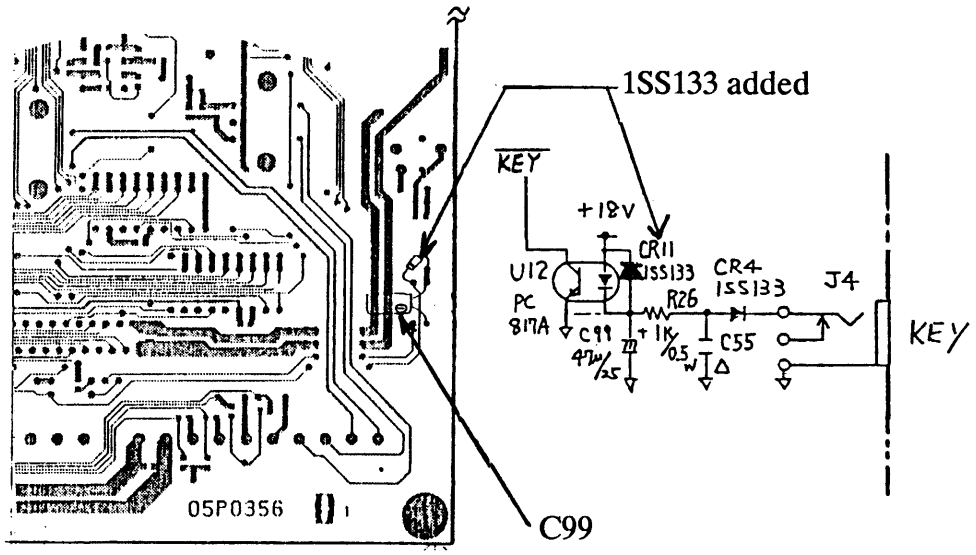
②

Symptom : Telegraph key input does not function.

Cause : When the POWER switch is turned off, the voltage charged by C55 on the AF board in the Control Unit is fed to photo coupler U12 (diode) and may cause U12 to be damaged. ③

C55 Charging voltage : 18V
U12 Reverse voltage (max.) : V_R = 6V

Remedy : Replace U12 with a new one and add diode 1SS133 (code no. : 000-103-097) in parallel with U12 as shown in the figure below. ④



⑤

⑥

⑦

AF board (Soldering side)

Note: If more than 40V is fed to the key input line, CR4 and U12 may be damaged. Confirm that key input line is not connected to other equipment.

⑧

Factory Modication : Delivery from October 1991 and after.

FURUNO

Information

NO. : FQ5-92-012

Date : 1992 - 4

Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 12 to Service Manual of FS-5000 SM-E5519

FS-5000/8000
Modification of TX FIL PCB

Symptom : "Excessive IC on PA" is observed on 12MHz.
(Power is automatically reduced, or the breaker of the PR-850 is shut down.)

Cause : Impedance on 12MHz in the TX FIL board viewed from the PA board is less than 50 ohms.

Factory Modification : Capacitance (for 12MHz or higher) in the TX FIL board has been changed as follows.

C41 : Deleted (100pF)
C43 : 27pF ⇨ 56pF (27pF added in parallel with C43)
C47 : 82pF ⇨ 100pF (22pF added in parallel with C47)
C49 : 68pF ⇨ 47pF

Model	Serial No.
FS–5000	2508-0367 and after
FS–8000	2522-0046 and after

Field Modification : Power data on each band should be reduced until IC on PA board becomes less than 21A.

Power data adjustment procedure:

1. Set TX frequency to desired band. (ex. 12MHz)
2. Press [STO] key followed by [FULL] key.
3. Press and hold [LOW] key to decrease the power data.
4. Transmit single tone. (Press [TEST TONE] key, then press PTT switch.)··· ***Note 1***
5. Check IC indication on the LCD. If IC display does not exceed 21A, release the PTT switch then press [ENT] key to memorize the power data.
6. Repeat steps 1 to 5 for all bands.

Note 1: To use test tone, change system setting as follows.
[STO] 9926 [ENT] 0 [ENT]

FURUNO

Information

NO. : FQ5-92-007

Date : 1992 - 4

Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 13 to Service Manual of FS-5000 SM-E5519

FS-5000/8000
Modification for Power Failure

Symptom : Power can not be supplied when pressing the [POWER] key.

Cause : Transmission signal from the FS-5000 itself is induced to the AF and INTERFACE boards due to improper ground, etc. (self-induction)

Remedy : Change resistance values (chip resistors) in the AF and INTERFACE boards as follows.

AF board

R70/R71 : 100 ohms ⇨ 330 ohms. (Carbon, 1/6W)

INTERFACE board

R18/R19 : 100 ohms ⇨ 330 ohms. (Carbon, 1/6W)

FURUNO

Information

NO. : FQ5-92-006

Date : 1992 - 4

Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 14 to Service Manual of FS-5000 SM-E5519

①

FS-5000/8000
Change of MIC Gain Adjustment

The MIC gain adjustment has been changed as below from Jan. 1992 to facilitate the factory adjustment. ②

Please amend pages 2-4 and 2-14 of the FS-5000 Service Manual.

Pages 2-4 and 2-14

Previous		*New*
Adjust **R6** on the EXC board for the output power of 100W for FS-5000, 200W for FS-8000. (TX freq : 16MHz, SSB, MIC input level: 1500Hz, **−54dBm**, PTT: ON, Power data: 255)	⇒	Find the frequency (1.6 to 25MHz) which the output power of the transceiver unit is the lowest, when the MIC input level is **−53dBm** of single tone. Then adjust **R8** on the EXC board for the output power of 100W for FS-5000, 200W (100W on MF band) for FS-8000.

③ ④ ⑤

Note: Power data

FS-5000 ... 255 (HF)
FS-8000 ... 255(HF)
180 (MF)

⑥

This adjustment is done at the factory. When you change the EXC or PA board locally, confirm the MIC gain adjustment if possible.

⑦

⑧

FURUNO

Information

NO. : FQ5-92-008

Date : 1922 - 4

Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 15 to Service Manual of FS-5000 SM-E5519

Errata and Addition of MIF Description for FS-5000 Service Manual

1. Amendment

Please amend the following pages of the Service Manual.

(1) Page AP2-8

Previous → ***New***

Channel	Resolution of Memory
	Each channel
	MF ··· 500kHz steps HF ··· 1MHz steps

⇒

MF ··· 500kHz steps
(2.0 – 2.5MHz, 2.5 – 3.0MHz) ← **Added**

Note 2 . If the error message···
(when IC exceeds **25A**)

⇒

If the error message···
(when IC exceeds **24.5A**)
↑ **Amended**

(2) Page AP2-9

Previous → ***New***

10. Repeat steps...is obtained.

⇒

10. Repeat steps...is obtained.
Then press the **ENT** key to memorize the power data.
↑ **Added**

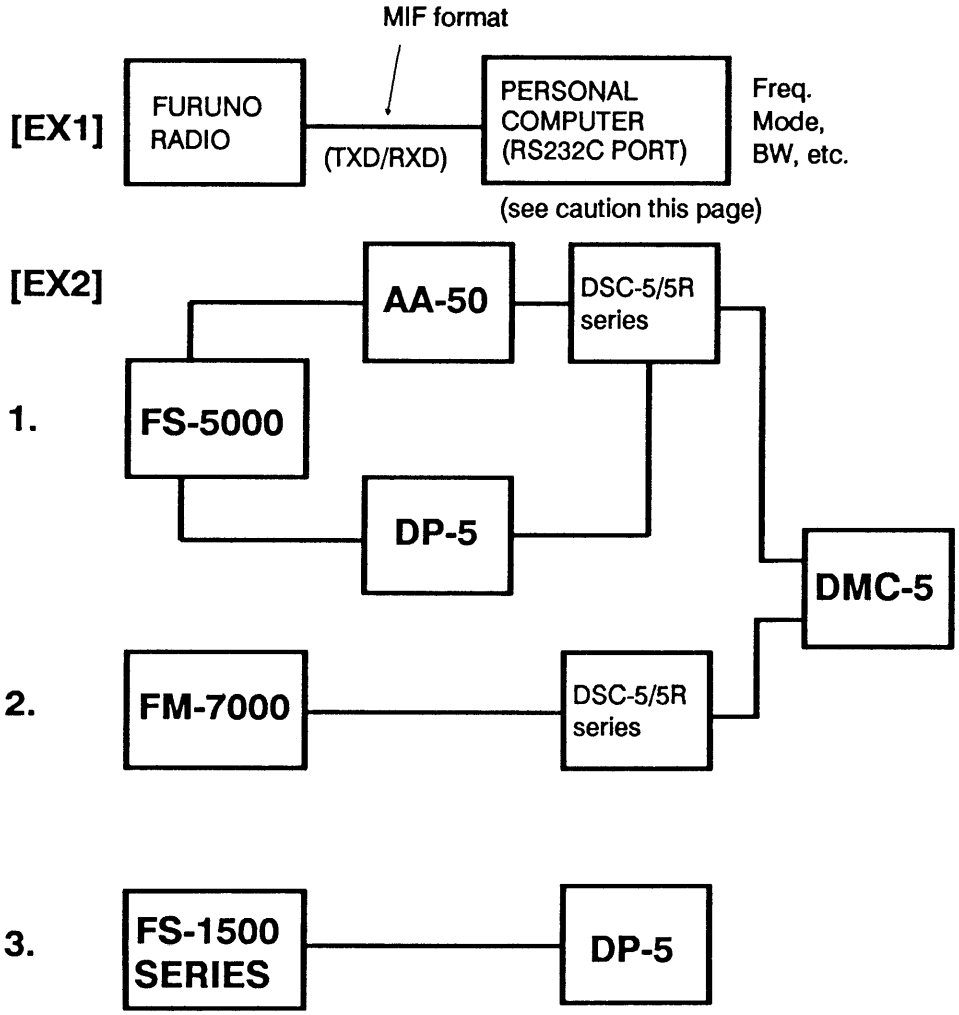
2. Addition of MIF description

We use MIF (Furuno Radio Interface), a handshaking type signal exchange system using TXD and RXD, for remote operation. Refer to the next page.

MIF FORMAT

MIF is a handshaking type signal exchange system developed by FURUNO for remote control of newly developed FURUNO radio equipment; for example, DP-5, FS-5000, FS-8000, DSC-5 and others.

Example for interconnection



*** All data are communicated in MIF format.**

CAUTION

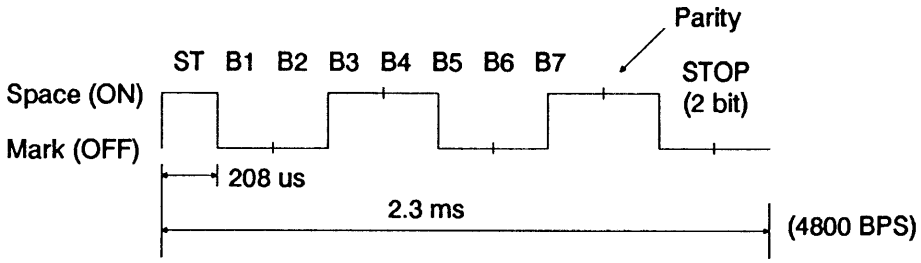
Furuno will assume no responsibility for the inconvenience/disturbance to communications or unlawful emission due to inadequate command from personal computer.

SPECIFICATION OF MIF

1. Communication System: Serial asynchronous (half-duplex)

2. Baud Rate: 4800 BPS standard
(1200/2400/9600 BPS selectable)

3. Character Format



Start	:	1 bit
Data (B1 to B7)	:	7 bit
Parity	:	1 bit (Even)
Stop	:	2 bit

------> 11 bit

4. Signal Level (RS-232C compatible, except FM-7000)

Name	Space	Mark
Logic	0 (ON)	1 (OFF)
Output	+ 5 to + 15 V	– 15 to – 5 V
Input	≥ 3 V	≤ – 3 V

* FM-7000 ----- Current Loop (±20 mA)

5. Pin Arrangement (except FM-7000)
(DTE: Data Terminal Equipment)

	Pin No.	Name	Function	Signal Logic	
				Positive Voltage	Negative Voltage
	1	FG	Frame Ground	–	–
	2	TXD	Transmission Data	Space (0)	Mark (1)
	3	RXD	Reception Data	Space (0)	Mark (1)
Jumper wire required	4	RTS (Not used)	Request to Send	Valid	Invalid
	5	CTS (Not used)	Clear to Send	–	–
Jumper wire required	6	DSR (Not used)	Data Set Ready	Valid	Invalid
	7	SG	Signal Ground	–	–
	20	DTR (Not used)	Data Transmit Ready	Valid	Invalid

* FM-7000	Pin No.	Name
	1	TXD (H)
	2	TXD (C)
	3	RXD (H)
	4	RXD (C)
	5	FG
	9	SG

6. Command Input: ASCII code,
Alphanumerals
(Alphabet: 2 digits, numeral: more than 1 digit)
End of Data ----- CR, LF or CR

Example

F R 1 2 3 4 5 6 7 CR (,LF)

↑ ↑

Command ID Data (Parameter)

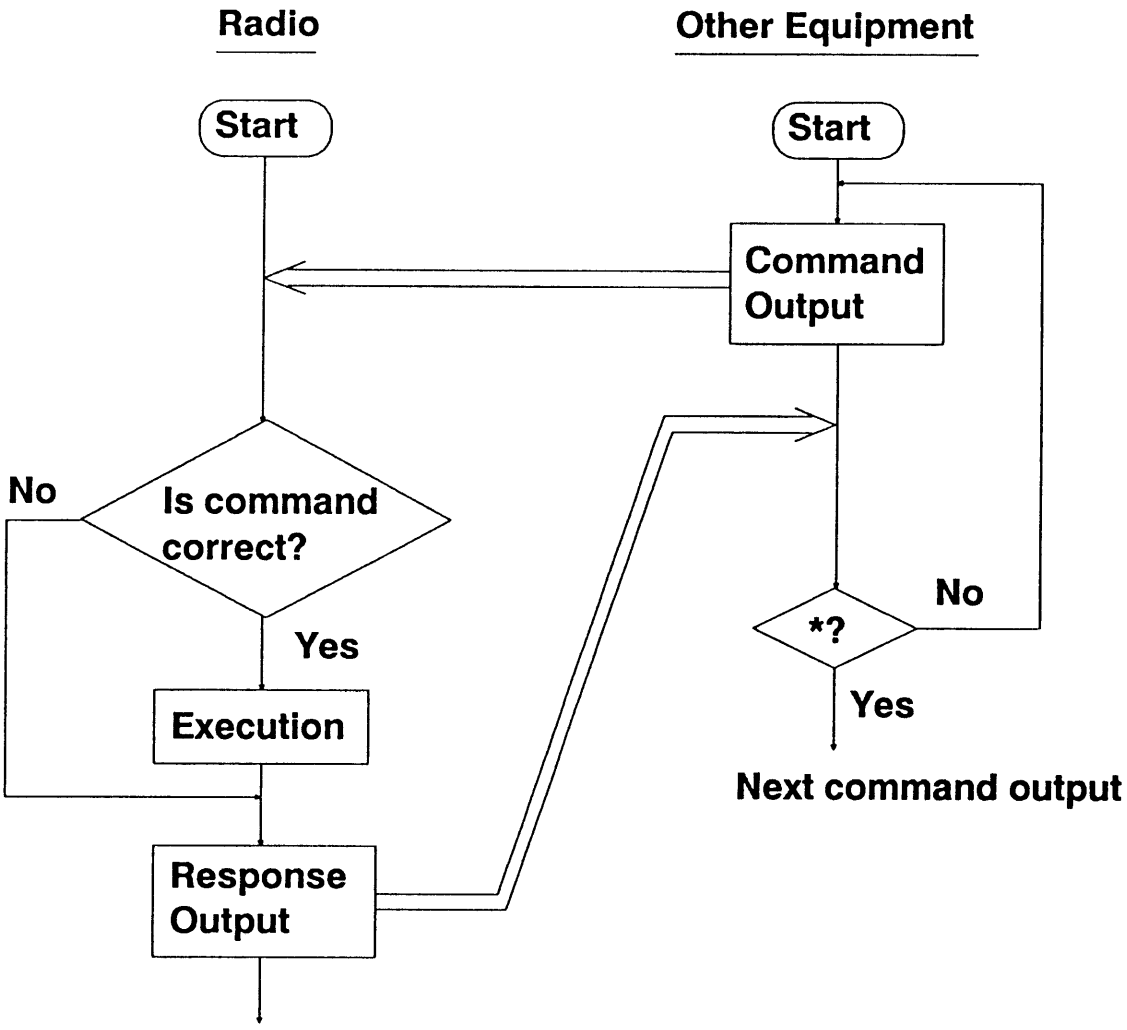
7. Response Output

1 * CR (LF) ------ When the command is correctly executed.

2 ? CR (LF) ------ When incorrect command is input, or error takes place during execution of the command.

Time out: 1 sec.

Retry: 3 times (60 sec only for tune command ("TU"))



8. Command Tables

The command tables show the function and valid parameter for each command. Note that some commands may not be valid **depending on transceiver/transmitter/receiver connected.**

Control	Command	Parameter
TRANSMISSION FREQUENCY	FT	6 digits/7 digits (last unit must be 10 Hz place) 1 2 3 4 5 6 7 10 MHz 1 MHz 1 kHz 10 Hz
RECEPTION FREQUENCY	FR	same as above
CLASS OF EMISSION	EM	0 to 6 : 1 digit 0: LSB 4: CW 1: USB 5: FSK (TELEX) 2: AM 6: FAX 3: R3E A1A : 3 digits For USB, enter "J3E".
BANDWIDTH	BW	0 to 7 : 1 digit 0: W-FM (25 kHz) 4: FSK (1kHz) 1: FM (16 kHz) 5: N-CW (0.5 kHz) 2: AM (6 kHz) 6: N-CW (0.3 kHz) 3: SSB (3 kHz) 7: VERY-N (0.2 kHz) 030 : 3 digits (10 kHz, 1 kHz, 100 Hz places)
AGC	AG	S : 1 digit 0: AGC OFF S: AGC ON 1: AGC ON (SLOW) R: AGC OFF 2: AGC ON (FAST) 3: AGC ON (MID)
BFO	BF	+ 0 8 0 0 : 5 digits (+/-, 1kHz, 100 Hz, 10 Hz, 1 Hz) S : 1 digit S: BFO ON U: BFO UP R: BFO OFF D: BFO DOWN
CLARIFIER	CL	+ 0 1 0 0 : 5 digits (+/-, 1kHz, 100 Hz, 10 Hz, 1 Hz) S : 1 digit S: Clarifier ON U: Clarifier UP R: Clarifier OFF D: Clarifier DOWN

continued

Control	Command	Parameter
SQUELCH	SQ	10 : 2 digits To adjust squelch threshold, enter hexadecimal code; FF provides tightest squelch. S : 1 digit S: Squelch ON R: Squelch OFF
NOISE BLANKER	NB	S : 1 digit S: Noise Blanker ON R: Noise Blanker OFF 1 0 : 2 digits To adjust sensitivity of noise blanker, enter hexadecimal code (00-FF); FF is highest threshold.
SPEAKER CONTROL	SP	S : 1 digit S: Speaker ON R: Speaker OFF
MUTE	MU	S : 1 digit S: Mute ON R: Mute OFF
BK	BK	S : 1 digit S: BK ON R: BK OFF
TX	TX	S : 1 digit S: TX ON R: TX OFF
EXCITER	EX	S : 1 digit S: Exciter ON R: Exciter OFF
TUNING	TU	No fixed parameter (Time out: 15 sec)
SPEAKER VOLUME	AF	U : 1 digit U: Increase Volume D: Decrease Volume 1 0 : 2 digits Enter hexadecimal code (00-FF); FF for maximum volume
SENSITIVITY	RF	U : 1 digit, same as "speaker volume" 1 0 : 2 digits, same as speaker volume.

continued

Control	Command	Parameter
DIMMER	DI	S : 1 digit S: Dimmer ON U: Brighten R: Dimmer OFF D: Dim 0 F : 2 digits Enter hexadecimal code (00-FF); FF for maximum brightness.
RF POWER	PO	0 to 3 : 1 digit 3: Full Power 1: Low Power 2: Mid Power 0: Zero Power 1 0 : 2 digits Enter hexadecimal code (00-FF); FF for maximum RF power.
RAISE FREQUENCY, CHANNEL	UP	0 to 7 : 1 digit 0: Raise Channel by one 4: Raise Freq. by 10 kHz 1: Raise Freq. by 10 Hz 5: Raise Freq. by 100 kHz 2: Raise Freq. by 100 Hz 6: Raise Freq. by 1 MHz 3: Raise Freq. by 1 kHz 7: Raise Freq. by 10 MHz
LOWER FREQUENCY, CHANNEL	DN	1 : 1 digit Same as above
CHANNEL NUMBER	CH	0001 : 4 digits --- retain current channel number. U001 : 4 digits --- U (W, N or P) + 3 digit ch. No. [U: USA, W: Weather, N: International, P: Private] PF01 : 4 digits --- PX + 2 digit ch. No. [X: F, P, L or M] G0101 : 5 digits --- G + 2 digit group No. + 2 digit ch. No. (for group ch.) I01001 : 6 digits --- I + 2 digit band No. + 3 digit ch. No. (for ITU ch.)
WRITE TO MEMORY	ST	Same as for channel number
RECALL FROM MEMORY	RC	Same as for channel number
FSK SHIFT WIDTH	FS	0 to 2 : 1 digit 0: 850 Hz 1: 425 Hz 2: 170 Hz 850 : 3 digits (desired width in Hz)
DUPLEX, SIMPLEX	DU	S : 1 digit S: Duplex ON 0: Full Duplex R: Duplex OFF 1: Semi Duplex 2: Simplex
FREQUENCY SCANNING	SC	S : 1 digit S: Start R: Stop

continued

Control	Command	Parameter
SCAN MODE	SM	1 to 4 : 1 digit 1: Scan Channel 2: Group Scan 3: Frequency Scan 4: Sweep
DATE	DT	10 digits: Example: March 20, 1991 1 9 9 1 / 0 3 / 2 0 Year Month Day
TIME OF DAY	TI	8 digits: Example: 13:25:30 1 3 / 2 5 / 3 0 Hour Minute Second
TIMER START & STOP	TS	S: :1 digit S: Start R: Stop
WAKE-UP TIMER	TM	1 to 4 : 1 digit 1: Timer 1 2: Timer 2 3: Timer 3 4: Timer 4
TIMER ON & OFF SETTING	TP	as desired
ATTENUATION ON & OFF	AT	S: :1 digit S: Receiver front end attenuator ON R: Receiver front end attenuator OFF
BAND	BA	1 : 1 digit 0: BAND 0 〉 F: BAND 15
FILTER SETTING	FL	1 : 1 digit 0: FILTER 0 〉 F: FILTER 15
SWITCH SETTING	SW	1 S : 2 digits 0S: SW 0 ON 0R: SW 0 OFF 〉 FS: SW 15 ON FR: SW 15 OFF

continued

Control	Command	Parameter
TRANSCEIVER CONDITION	CA	FT : 2 digits Type CA followed by desired command. Example: To show current receive frequency, enter CAFR.
TRANSCEIVER MODEL NAME	CA	ID : 2 digits Example # ID FS5000
S-METER LEVEL	CA	SL : 2 digits Example # SL0F (0F = hexadecimal)
OPERATION LOCK	FZ	S : 1 digit S: Prevents operation of the transceiver. R: Releases the transceiver.
DISTRESS TRANSMISSION	DR	S : Start distress R : Stop distress
SELCALL TRANSMISSION	SE	S (ID CODE): S: Own Station ID setting G: Group ID setting C: Selcall Transmission
AUTOMATIC PUBLIC TELEPHONE DIALING	TL	Telephone Number Example: TL 0798 65 2111 Command Parameter
INTERCOM	IC	1 digit Intercom Number, or S or R: If calling from a controller, command and parameter are transmitted. I C 3 S Command S: Intercom ON R: Intercom OFF
RESET	RE	No parameters required. SSB generates "RE" command when it turns on, to try to receive again the command sent previously.
OPTION	OP	Unique command for an equipment . ex: OP FR xxxxxxxxxx 10 digits

Note: For FS-5000 (8000) and FM-7000 radiotelephones, the following commands are available.

FS-5000(8000)
FT/FR/EM (0 to 6)/BW/TU/CH/ST/RC/
FZ/DR/RE/TX/CAFT/CAFR/CAID/
CAEM/CASL/CASQ/CABF, etc.

FM-7000
CH/DU/FZ/DR/RE/
CACH/CAID, etc.

FURUNO
Information

NO. : FQ5-92-009
Date : 1992 - 4
Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 16 to Service Manual of FS-5000 SM-E5519

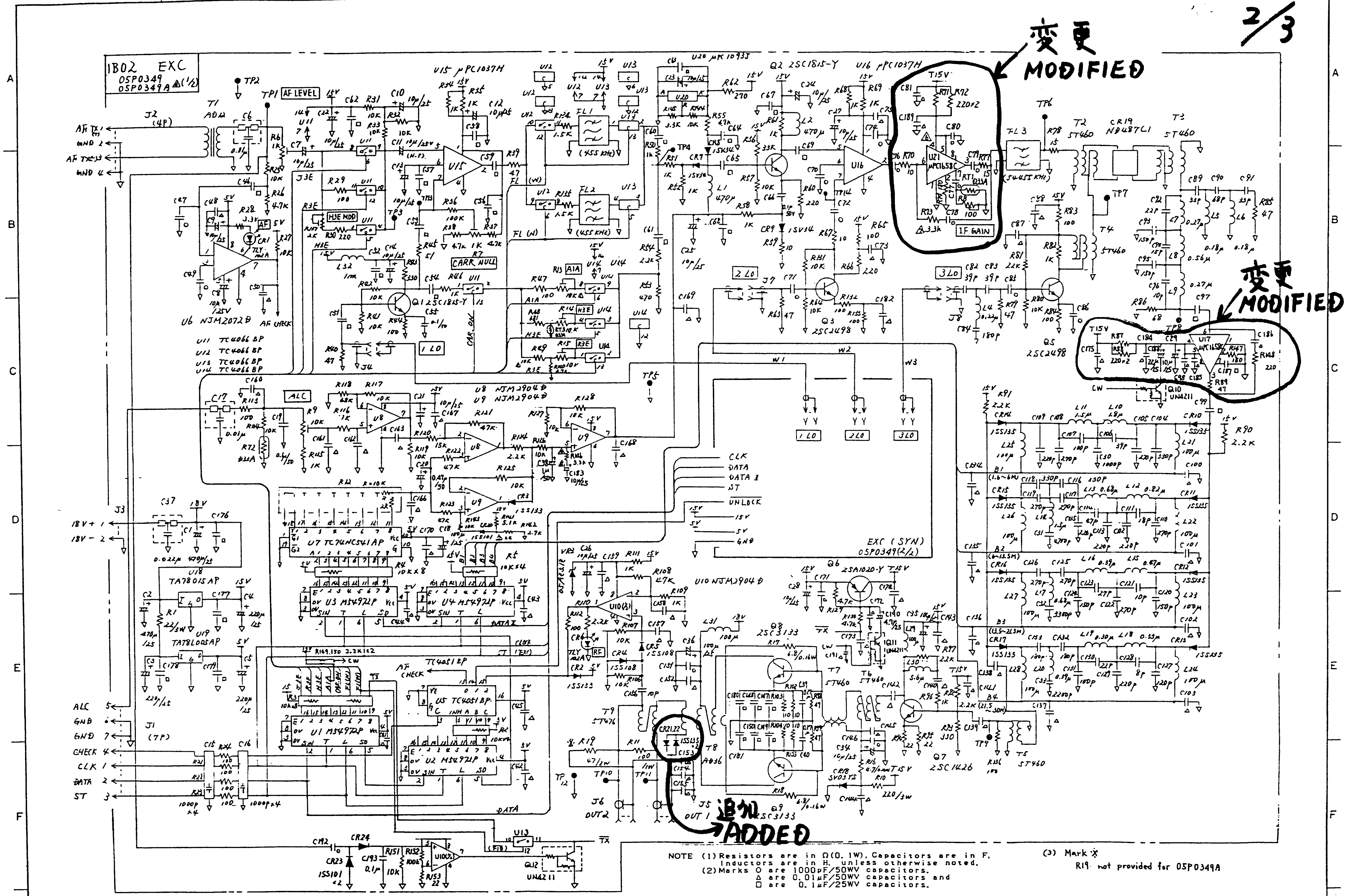
FS-5000/8000 Improvement of Duplex Communication

To reduce transmission noise in duplex communication, the EXC and RX boards have been modified for the sets having the serial numbers shown below. Refer to new schematic diagrams attached.

Model	Serial No.
FS–5000	2908-0225 to 0227, 0303 and after
FS–8000	2522-0041 and after

This modification improves duplex communication quality provided the receiving antenna is separated **at least 5 meters** from the transmitting antenna. (Of course, it is better to install the receiving antenna far away from the transmitting antenna.)

To reduce transmission noise, we recommend setting AGC and NB (Noise Blanker) to FAST and ON, respectively.

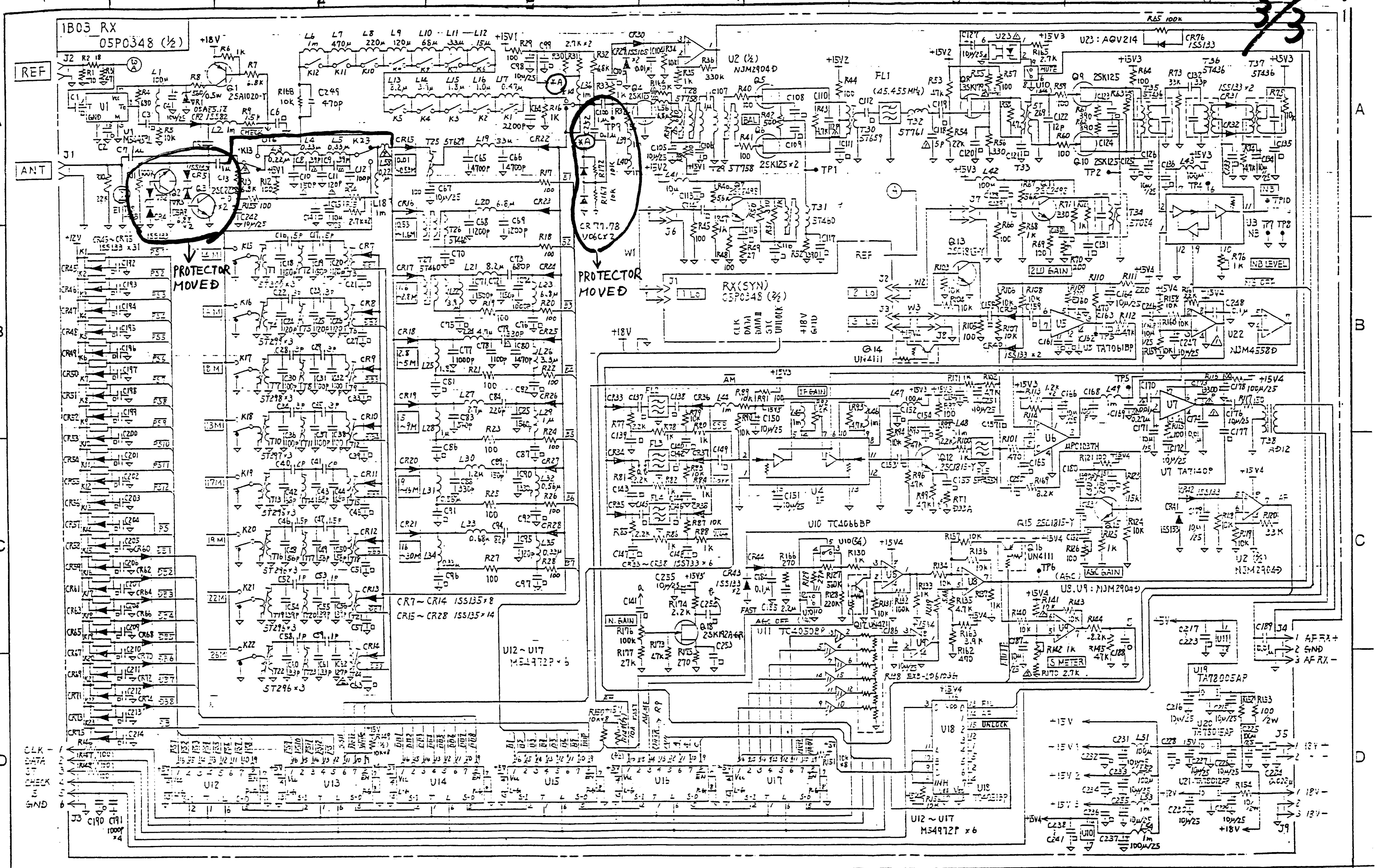


NOTE (1) Resistors are in Ω(0.1W). Capacitors are in F. Inductors are in H. unless otherwise noted.
(2) Marks ○ are 1000pF/50WV capacitors.
△ are 0.01μF/50WV capacitors and
□ are 0.1μF/25WV capacitors.

(3) Mark ※
R19 not provided for 05P0349A

主機種	FS-5000	コード		SHEET NO.	1/2
		型名			
課長 検図 設計 製図		TITLE	1B02 (1/2) EXC (TRANSCEIVER UNIT)		
		DWG. No.	C5519-K09-D		

古野電気株式会社



Note. 1) Marks ○ are 1000 PF 50WV Capacitors.
2) Marks △ are 0.01μF 50WV Capacitors.
3) Marks □ are 0.1μF 25WV Capacitors.
4) Resistors are in Ω (0.1w), Capacitors are in F, Inductors are in H, unless otherwise noted.

主機種	FS-5000	コード		SHEET NO.	1/2
		型名			
課長	検図	設計	製図	TITLE	1B03 (1/2) RX (TRANSCEIVER UNIT)
				DWG. No.	C5519-K02-D

古野電気株式会社

FURUNO

Information

NO. : FQ5-92-010

Date : 1992 - 4

Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

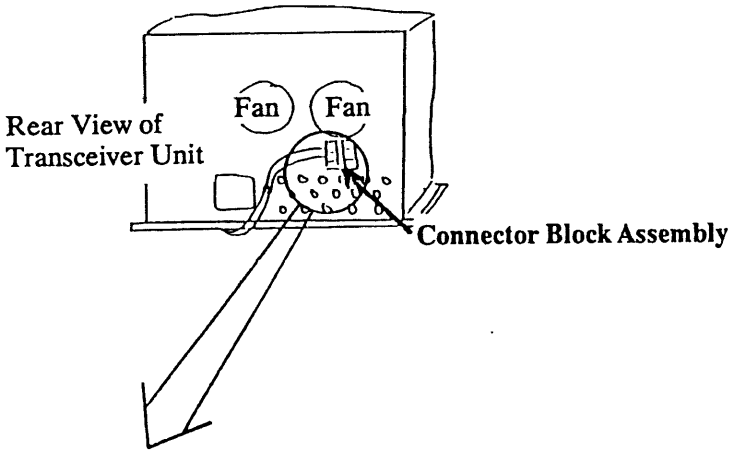
Addenda No. 17 to Service Manual of FS-5000 SM-E5519

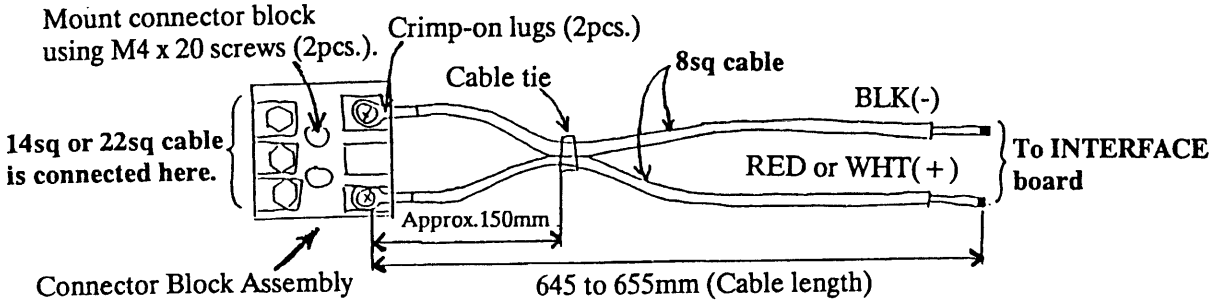
FS-5000/8000 Optional Supply of Connector Block Assembly (Terminal Board for power cable)

If the 14sq or 22sq power cable is used instead of the 8sq cable, it can not be connected to the power terminals, whose diameters are for 8sq cable, on the INTERFACE board in the transceiver unit.

To solve this problem, the connector block assembly is optionally supplied. The assembly mounts on the rear panel of the transceiver unit as shown below.

Name	Type	Code No.	Remarks
Connector Block Assembly	OP05-49	005-841-200	For FS-5000
	OP05-48	005-841-190	For FS-8000





FURUNO

Information

NO. : FQ5-92-011

Date : 1922 - 4

Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 18 to Service Manual of FS-5000 SM-E5519

①

FS-5000/8000
ROM Program Change (Ver. 10)

The program version of the ROMs on the control and transceiver units has been changed to "10" from March 1992. ②

Version 8 → 9

1. Contents of Modification ③

① Highest Priority of Distress Command ("DRS")

The "DRS" (Distress Set) command has the highest priority in the MIF data protocol.

The FS-5000/8000 accepts the "DRS" command from the DSC terminal to transmit a distress alert, even while transmitting. ④

② TX ON Command (TXS, TXR) added.

③ Frequency on DSC channel 9 amended. (5389kHz → 5380kHz)

Version 9 → 10 ⑤

1. Contents of Modification

① Additional System Settings (See next page.)

([STO] → Channel No. → [ENT])

⑥

⑦

⑧

<table>
<tr><th>Channel No.</th><th>LCD Display</th><th>Description</th></tr>
<tr><td>9947</td><td>SQ on Telex [0-Def, 1-OFF]</td><td>The "1" setting automatically turns off the SQ (if ON) when class of emission is changed to TELEX. (Note that AF signal to DP-5 is not passed through squelch circuit, so this setting is normally not necessary for DP-5 connection.)</td></tr>
<tr><td>9948</td><td>NB on Telex [0-Def, 1-OFF]</td><td>The "1" setting automatically turns off the NB (if ON) when class of emission is changed to TELEX.</td></tr>
<tr><td>9949</td><td>AGC on Telex [0-Def, 1-FAST]</td><td>The "1" setting sets AGC to FAST when class of emission is changed to TELEX.</td></tr>
<tr><td>9950</td><td>Duplex on Telex [0-Def, 1-OFF]</td><td>The "1" setting inhibits DUPLEX mode (unnecessary on TELEX) when class of emission is changed to TELEX.</td></tr>
<tr><td>9961</td><td>ITU Freq. Table [0-INT, 1-USA, 2-EU]</td><td>MF band ITU frequency list added.
(at [2-EU] selection)</td></tr>
<tr><td>9980</td><td>Country Code [44] (Enter numerals.)</td><td>Returns to default setting depending on country. See the next page.</td></tr>
<tr><td>9981</td><td>Dummy Load [0-NO, 1-YES]</td><td>Determines the functions of both 9911 and 9923 as follows:
<table>
<tr><th>9981</th><th>[0] NO</th><th>[1] YES</th></tr>
<tr><td>9911 : Alarm</td><td>0-Receive</td><td>1-Transmit</td></tr>
<tr><td>9923 : Dummy</td><td>1-Inhibit</td><td>0-Enable</td></tr>
</table></td></tr>
<tr><td>9982</td><td>A. BK relay or R. ANT [0-NO, 1-YES]</td><td>Determines the functions of both 9913 and 9917 as follows:
<table>
<tr><th>9982</th><th>[0] NO</th><th>[1] YES</th></tr>
<tr><td>9913 : System Delay</td><td>30ms</td><td>10ms</td></tr>
<tr><td>9917 : 50 ohm BK Relay</td><td>0-on/off</td><td>1-Permanently on (fixed)</td></tr>
</table></td></tr>
<tr><td>9989</td><td>Power setting for [1-EU, 2-NOR]</td><td>Setting of power data.
"EU"(Europe) Power data
1.6~2.5MHz : FS-5000 ····· 225
FS-8000 ····· 160
"NOR" (Norway) Power data
1.6~2.5MHz : FS-5000 only ··· 200
2.5~4.0MHz : FS-5000 only ··· 210
4.0~30 MHz : FS-5000 only ··· 225</td></tr>
</table>

			Country Code					
Setting Number	Function	Default 0	Japan 81	USA 1	Europe 44	Norway 47	Holland 31	Result of selection
9901	TX freq. selection	0				3		Marine
9903	TX o/p on MF band	0	2	1				50/150
9904	Class of emission on 2182 KHz	0		1				J3E
9907	Time display format	0		1	2	2	2	USA/EU
9910	Check meter numerics	0	1					
9913	System delay	30				10		
9917	50 ohm BK relay	0				1		on
9923	Dummy load	0	1	1	1	1	1	off
9926	Test tone	0		1	1	1	1	off
9927	Power reduction enable	0		1	1	1	1	2182
9928	Min o/p power	0		1	1	1	1	more than 60w
9947	SQ on TLX	0					1	off
9948	NB on TLX	0					1	off
9949	AGC FAST on TLX	0					1	FAST
9950	DUPLEX on TLX	0					1	Inhibit
9953	AM Operation	0		3	3	3	3	2182
9954	R3E Operation	0	1		1	1	1	RX
9955	FAX Operation	0	1		1	1	1	RX
9956	LSB Operation	0	1		1	1	1	RX
9961	ITU Freq. Table	0		1	2	2	2	USA/EU

Note: Where no data appears, default setting applies.

② Default Setting of System Delay for FS-8000 : 10ms

③ ITU Frequency Table and class of Emission

For previous software, if an operator changes class of emission after entering an ITU channel number, the channel did not change; only the class of emission changed. Now, the channel changes to the one corresponding to the class of emission selected.

(e.g.) Enter ITU401(SSB). → Change class of emission to TELEX. → Frequency changes to ITU4001.

④ Reduction ratio of power data is incorrectly published as decreasing in steps of 50.

55 is correct

LCD display	*Power data*	
Full	255	
		-55
LOW1	200	
		-55
LOW2	145	

⑤ MIF data (except for distress command "DRS" from DSC terminal) is ignored when both TX and RX frequencies are set at 2182kHz.

2. Factory Modification

Model	Serial Number
FS-5000	2508-0367 and after
FS-8000	2522-0046 and after

3. ROM Code Number

Type	Code No.
ROM05-501-31-110	005-927-440

MF BAND ITU TELEX FREQUENCY TABLE

Channel No.	Coast station (NBDP) (DSC) (kHz)	Ship station (NBDP) (DSC) (kHz)
201	1607	2142
202	1607.5	2142.5
203	1608	2143
204	1608.5	2143.5
205	1609	2144
206	1609.5	2144.5
207	1610	2145
208	1610.5	2145.5
209	1611	2146
210	1611.5	2146.5
211	1612	2147
212	1612.5	2147.5
213	1613	2148
214	1613.5	2148.5
215	1614	2149
216	1614.5	2149.5
217	1615	2150
218	1615.5	2150.5
219	1616	2151
220	1616.5	2151.5
221	1617	2152
222	1617.5	2152.5
223	1618	2153
224	1618.5	2153.5
225	1619	2154
226	1619.5	2154.5
227	1620	2155
228	1620.5	2155.5
229	1621	2156
230	1621.5	2156.5
231	1622	2157
232	1622.5	2157.5
233	1623	2158
234	1623.5	2158.5
235	1624	2159
236	1624.5	2159.5

MF BAND ITU SSB FREQUENCY TABLE

Channel No.	Coast station assigned frequency (kHz)	Ship station assigned frequency (kHz)	Channel No.	Coast station assigned frequency (kHz)	Ship station assigned frequency (kHz)
241	1636.4 (1635)	2061.4 (2060)	271	1726.4 (1725)	2070.4 (2069)
242	1639.4 (1638)	2064.4 (2063)	272	1729.4 (1728)	2073.4 (2072)
243	1642.4 (1641)	2067.4 (2066)	273	1732.4 (1731)	2076.4 (2075)
244	1645.4 (1644)	2070.4 (2069)	274	1735.4 (1734)	2079.4 (2078)
245	1648.4 (1647)	2073.4 (2072)	275	1738.4 (1737)	2082.4 (2081)
246	1651.4 (1650)	2076.4 (2075)	276	1741.4 (1740)	2085.4 (2084)
247	1654.4 (1653)	2079.4 (2078)	277	1744.4 (1743)	2088.4 (2087)
248	1657.4 (1656)	2082.4 (2081)	278	1747.4 (1746)	2091.4 (2090)
249	1660.4 (1659)	2085.4 (2084)	279	1750.4 (1749)	2094.4 (2093)
250	1663.4 (1662)	2088.4 (2087)	280	1753.4 (1752)	2097.4 (2096)
251	1666.4 (1665)	2091.4 (2090)	281	1756.4 (1755)	2100.4 (2099)
252	1669.4 (1668)	2094.4 (2093)	282	1759.4 (1758)	2103.4 (2102)
253	1672.4 (1671)	2097.4 (2096)	283	1762.4 (1761)	2106.4 (2105)
254	1675.4 (1674)	2100.4 (2099)	284	1765.4 (1764)	2109.4 (2108)
255	1678.4 (1677)	2103.4 (2102)	285	1768.4 (1767)	2112.4 (2111)
256	1681.4 (1680)	2106.4 (2105)	286	1771.4 (1770)	2115.4 (2114)
257	1684.4 (1683)	2109.4 (2108)	287	1774.4 (1773)	2118.4 (2117)
258	1687.4 (1686)	2112.4 (2111)	288	1777.4 (1776)	2121.4 (2120)
259	1690.4 (1689)	2115.4 (2114)	289	1780.4 (1779)	2124.4 (2123)
260	1693.4 (1692)	2118.4 (2117)	290	1783.4 (1782)	2127.4 (2126)
261	1696.4 (1695)	2121.4 (2120)	291	1786.4 (1785)	2130.4 (2129)
262	1699.4 (1698)	2124.4 (2123)	292	1789.4 (1788)	2133.4 (2132)
263	1702.4 (1701)	2127.4 (2126)	293	1792.4 (1791)	2136.4 (2135)
264	1705.4 (1704)	2130.4 (2129)	294	1795.4 (1794)	2139.4 (2138)
265	1708.4 (1707)	2133.4 (2132)	295	1798.4 (1797)	2061.4 (2060)
266	1711.4 (1710)	2136.4 (2135)			
267	1714.4 (1713)	2139.4 (2138)			
268	1717.4 (1716)	2061.4 (2060)			
269	1720.4 (1719)	2064.4 (2063)			
270	1723.4 (1722)	2067.4 (2066)			

( ): CARRIER FREQUENCY

FURUNO
Information

NO. : FQ5-92-005 1/2
Date : 1992 - 4
Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 19 to Service Manual of FS-5000 SM-E5519.

FS-5000/8000
System Setting for Connection to NBDP

FS-5000

1. In case that a receiving antenna or ANT BK RELAY board is installed.

(1) System setting of FS-5000
50 ohm BK relay and TX delay time should be set to "ON" (fixed) and 10 ms, respectively.

STO 9982 **ENT** 1 **ENT**

(2) System setting of NBDP

① When DP-5 is connected ("Terminal" menu setting)

Slave Delay	:	4ms
BK Timing Pre tone	:	10ms
Post tone	:	0ms
Mute Timing Pre BK	:	0ms
Post BK	:	0ms

② When TT-1600 is connected

Receiver Post Mut	:	0×1.25ms
Transmitter Pre Key	:	8×1.25ms
Transmitter Post Key	:	0×1.25ms
Slave Delay	:	8×1.25ms

2. In case that 50 ohm BK relay is used.

(1) System setting of FS-5000
50 ohm BK relay and TX delay time should be set to "ON/OFF" and 30 ms, respectively.

STO 9982 **ENT** 0 **ENT**

(2) System setting of NBDP

① When DP-5 is connected

Slave Delay	:	30ms
BK Timing Pre tone	:	30ms
Post tone	:	0ms
Mute Timing Pre BK	:	0ms
Post BK	:	0ms

② When TT-1600 is connected

Receiver Post Mute	:	0×1.25ms
Transmitter Pre Key	:	24×1.25ms
Transmitter Post Key	:	0×1.25ms
Slave Delay	:	24×1.25ms

FS-8000

(1) System setting of FS-8000
TX delay time should be set to 10ms.

STO 9913 **ENT** 10 **ENT**

(2) System setting of NBDP

① When DP-5 is connected ("Terminal" menu setting)

Slave Delay	:	4ms
BK Timing Pre tone	:	10ms
Post tone	:	0ms
Mute Timing Pre BK	:	0ms
Post BK	:	0ms

② When TT-1600 is connected

Receiver Post Mute	:	0×1.25ms
Transmitter Pre Key	:	8×1.25ms
Transmitter Post Key	:	0×1.25ms
Slave Delay	:	8×1.25ms

FURUNO

Information

NO. : FQ5-92-013

Date : 1992 - 4

Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

Addenda No. 20 to Service Manual of FS-5000 SM-E5519

①

FS-5000/8000
New Antenna Coupler

The Antenna Coupler AT-5000 has been modified to withstand a higher voltage on MF band (induced by a short antenna). Production of new coupler starts in May 1992. A heavy duty type stainless steel coupler is optionally available, for preventing icing, etc. ②

The following are the changes incorporated in the new coupler.

③

1. In the tuning circuit, voltage tolerance and capacitance of each element are remarkably increased. The COUPLER board is completely changed. Note that a new COUPLER board (05P0358-44) is interchangeable with a previous one (05P0358-33).

④

2. Antenna tuning sequence is changed. Refer to attached sheet.

3. A shortening capacitor and coupling capacitor (shunt capacitor) are automatically connected according to antenna length.

⑤

4. Memory device to store tuning data is changed from a RAM to a E^2PROM, to store the data permanently.

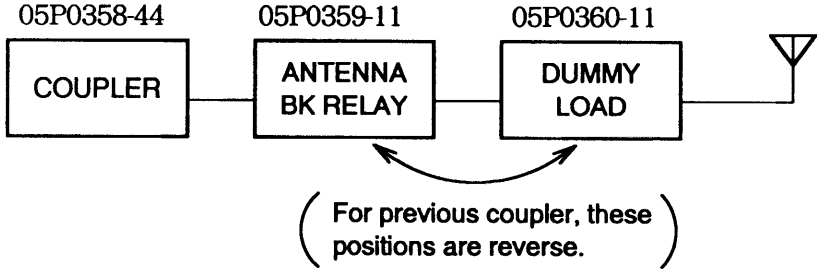
5. CPU is changed. (ROM/RAM/AD converter incorporated)

⑥

6. DUMMY LOAD and ANT BK RELAY boards are modified to withstand a higher voltage. (Both boards can be used in a previous version antenna coupler; but both previous boards can not be used in a new coupler.)

⑦

7. Interconnection of COUPLER, DUMMY LOAD and ANT BK RELAY boards is changed.



⑧

8. Arrester gap is changed to 3mm.

9. Fixing method of coaxial cable is changed. (Two cable clamps are supplied.)

Types of New Antenna Coupler, Dummy Load PCB Assy. and Antenna BK Relay PCB Assy.

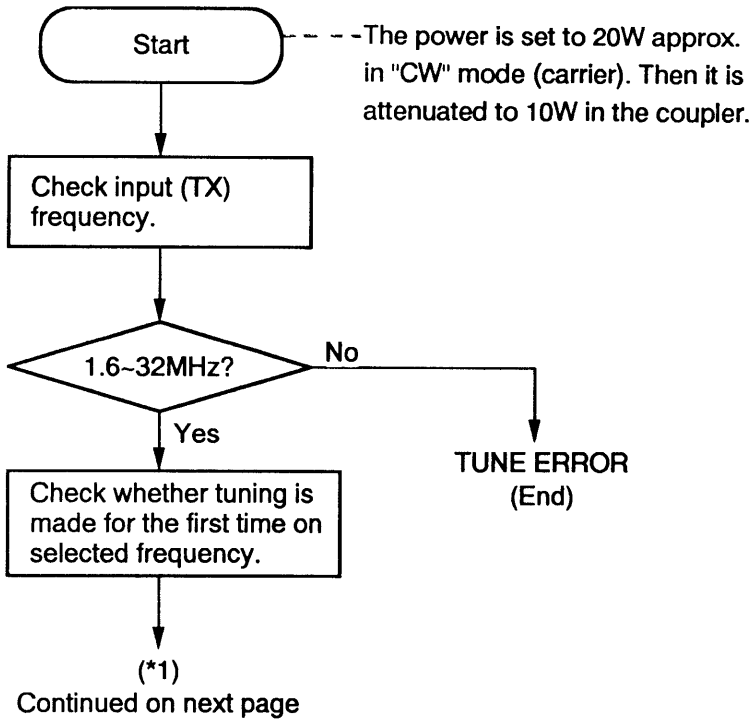
	New Antenna Coupler	Dummy Load PCB Assy.	Antenna BK Relay PCB Assy.
Type	AT-5000-H (Plastic)	OP05-34-H (for plastic antenna coupler)	OP05-35-H
	AT-5000-HS (Stainless Steel)	OP05-51-H...Note 1 (for stainless steel antenna coupler)	

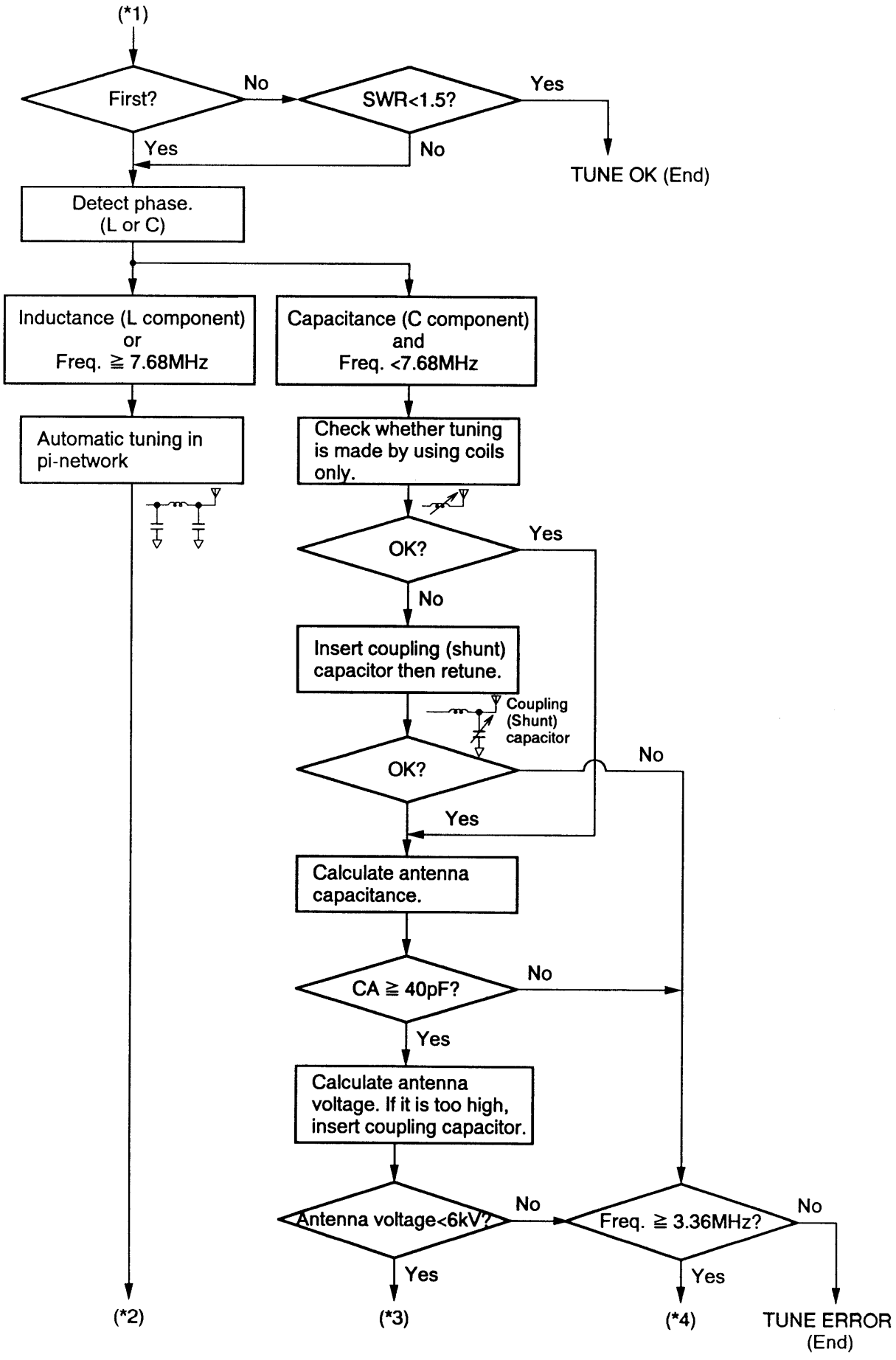
Note 1: Fixing screws are different.

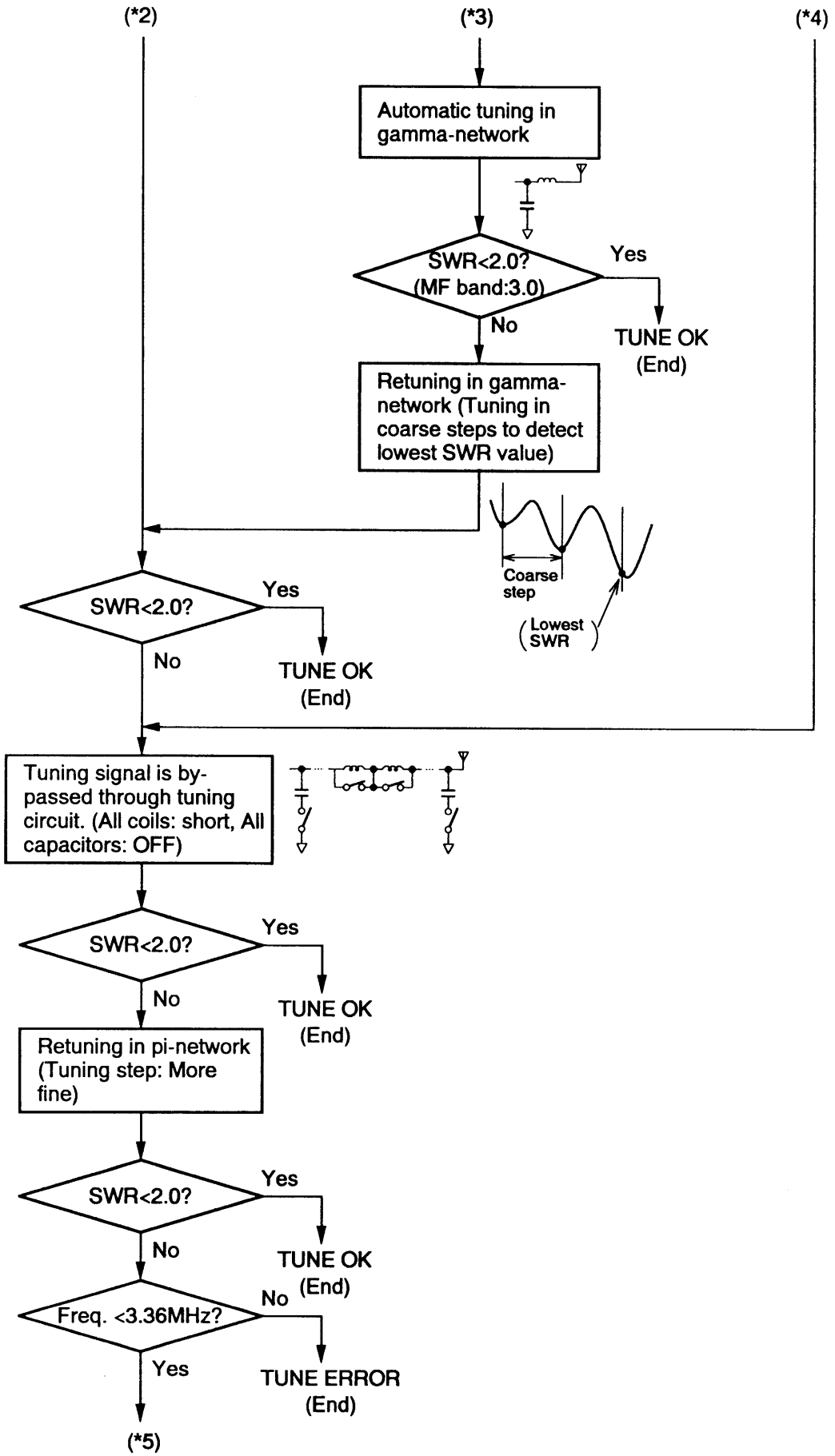
Factory Modification

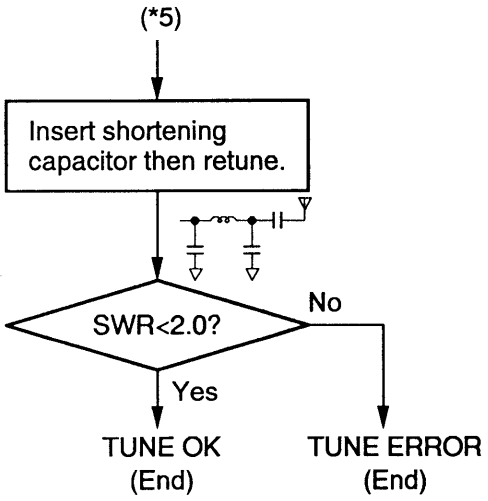
Numbering of the new coupler begins from 1001.

Antenna Tuning Sequence

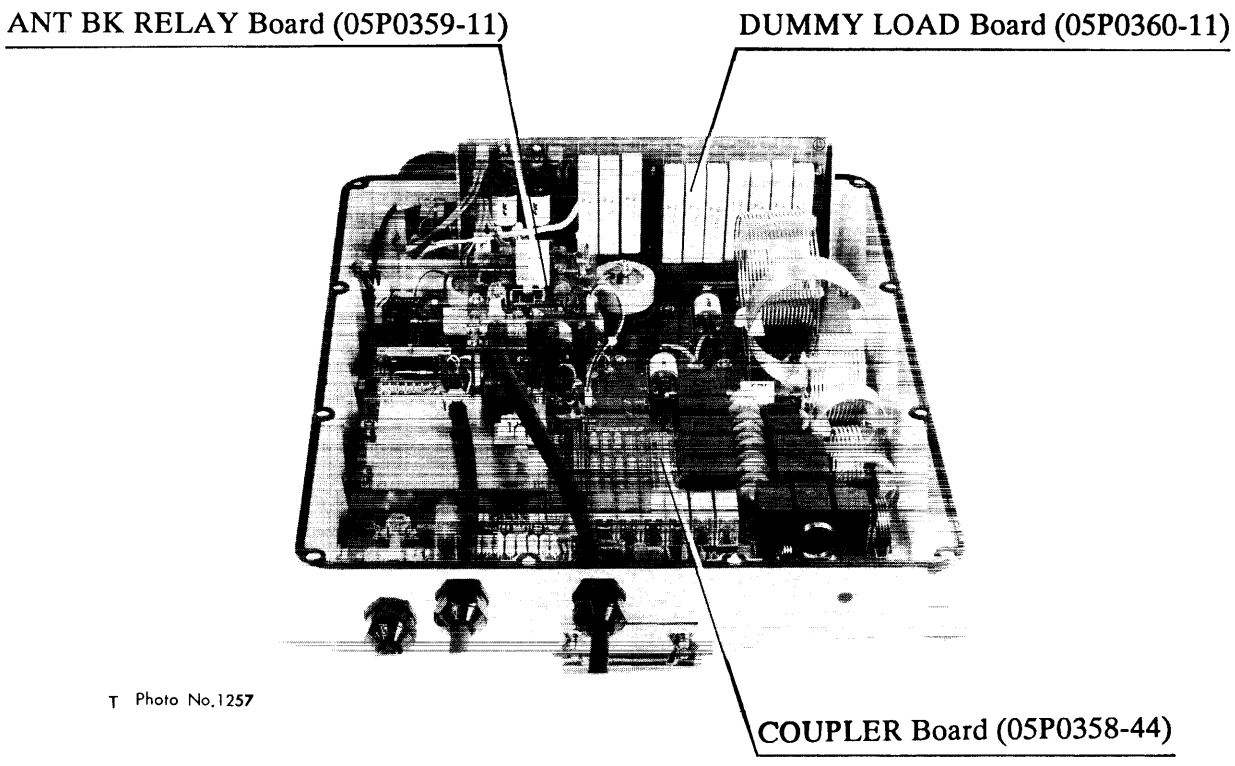



(*1)
First?
No
SWR<1.5?
Yes
TUNE OK (End)
Yes
No
Detect phase.
(L or C)
Inductance (L component)
or
Freq. ≧ 7.68MHz
Capacitance (C component)
and
Freq. <7.68MHz
Automatic tuning in
pi-network
Check whether tuning
is made by using coils
only.
OK?
Yes
No
Insert coupling (shunt)
capacitor then retune.
Coupling
(Shunt)
capacitor
OK?
No
Yes
Calculate antenna
capacitance.
CA ≧ 40pF?
No
Yes
Calculate antenna
voltage. If it is too high,
insert coupling capacitor.
Antenna voltage<6kV?
No
Freq. ≧ 3.36MHz?
No
Yes
Yes
(*2)
(*3)
(*4)
TUNE ERROR
(End)


(*2)
(*3)
(*4)
Automatic tuning in gamma-network
SWR<2.0? (MF band:3.0)
Yes
No
TUNE OK (End)
Retuning in gamma-network (Tuning in coarse steps to detect lowest SWR value)
Coarse step
Lowest SWR
SWR<2.0?
Yes
No
TUNE OK (End)
Tuning signal is by-passed through tuning circuit. (All coils: short, All capacitors: OFF)
SWR<2.0?
Yes
No
TUNE OK (End)
Retuning in pi-network (Tuning step: More fine)
SWR<2.0?
Yes
No
TUNE OK (End)
Freq. <3.36MHz?
No
Yes
TUNE ERROR (End)
(*5)

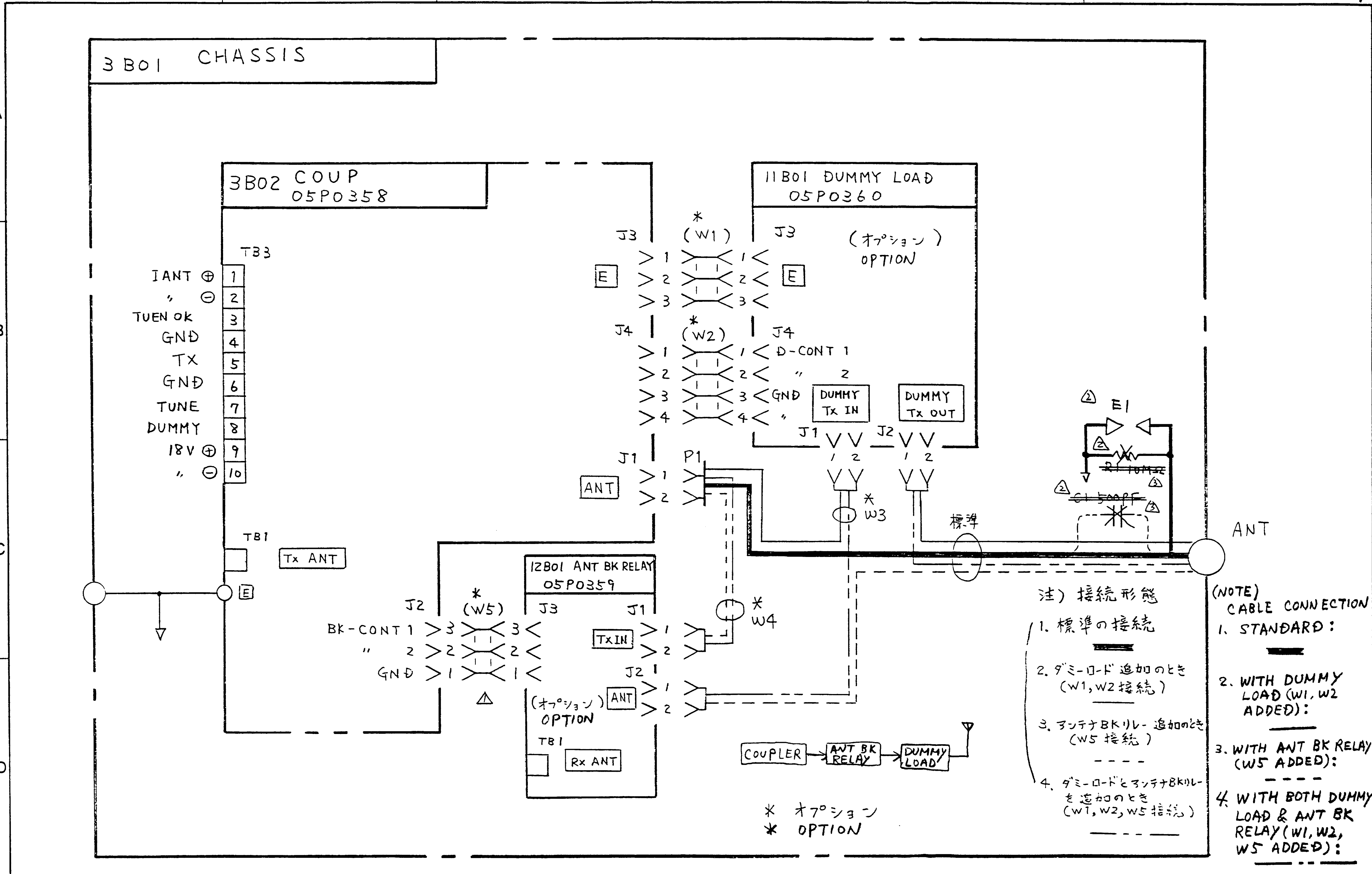


TUNE OK:	Relay status retained. (Data is stored in E²PROM.) "TUNE OK " command is sent to transceiver unit.
TUNE ERROR:	Tuning circuit is bypassed. "TUNE ERROR" command is sent to transceiver unit.



T Photo No.1257

New Antenna Coupler (AT-5000-H)



3B01 CHASSIS
3B02 COUP 05P0358
TB3
1ANT ⊕
〃 ⊖
TUEN OK
GND
TX
GND
TUNE
DUMMY
18V ⊕
〃 ⊖
TB1
Tx ANT
E
11B01 DUMMY LOAD 05P0360
(オプション) OPTION
J3
J4
J1
J2
P1
(W1)
(W2)
W3
W4
(W5)
ANT
D-CONT 1
〃 2
GND
DUMMY Tx IN
DUMMY Tx OUT
E1
R1 10MΩ
C1 500PF
標準
12B01 ANT BK RELAY 05P0359
BK-CONT 1
〃 2
GND
TxIN
(オプション) OPTION
Rx ANT
COUPLER
ANT BK RELAY
DUMMY LOAD
* オプション
* OPTION
注) 接続形態
1. 標準の接続
2. ダミーロード追加のとき (W1, W2 接続)
3. アンテナBKリレー追加のとき (W5 接続)
4. ダミーロードとアンテナBKリレーを追加のとき (W1, W2, W5 接続)
(NOTE) CABLE CONNECTION
1. STANDARD:
2. WITH DUMMY LOAD (W1, W2 ADDED):
3. WITH ANT BK RELAY (W5 ADDED):
4. WITH BOTH DUMMY LOAD & ANT BK RELAY (W1, W2, W5 ADDED):

変更通知書番号	符号	訂正年月日	訂正記事	担当	
05E3-1812	4	4.3.16	ダミ+ANTBK配経路変更	山本	×1
05E3-1775	3	3.12.9	C1, R1 削除	山本	×2
05E3-1601	2	2.5.10	C1, E1, R1 追加	山本	×3
05E3-1566	1	2.1.12	誤記訂正	家城	

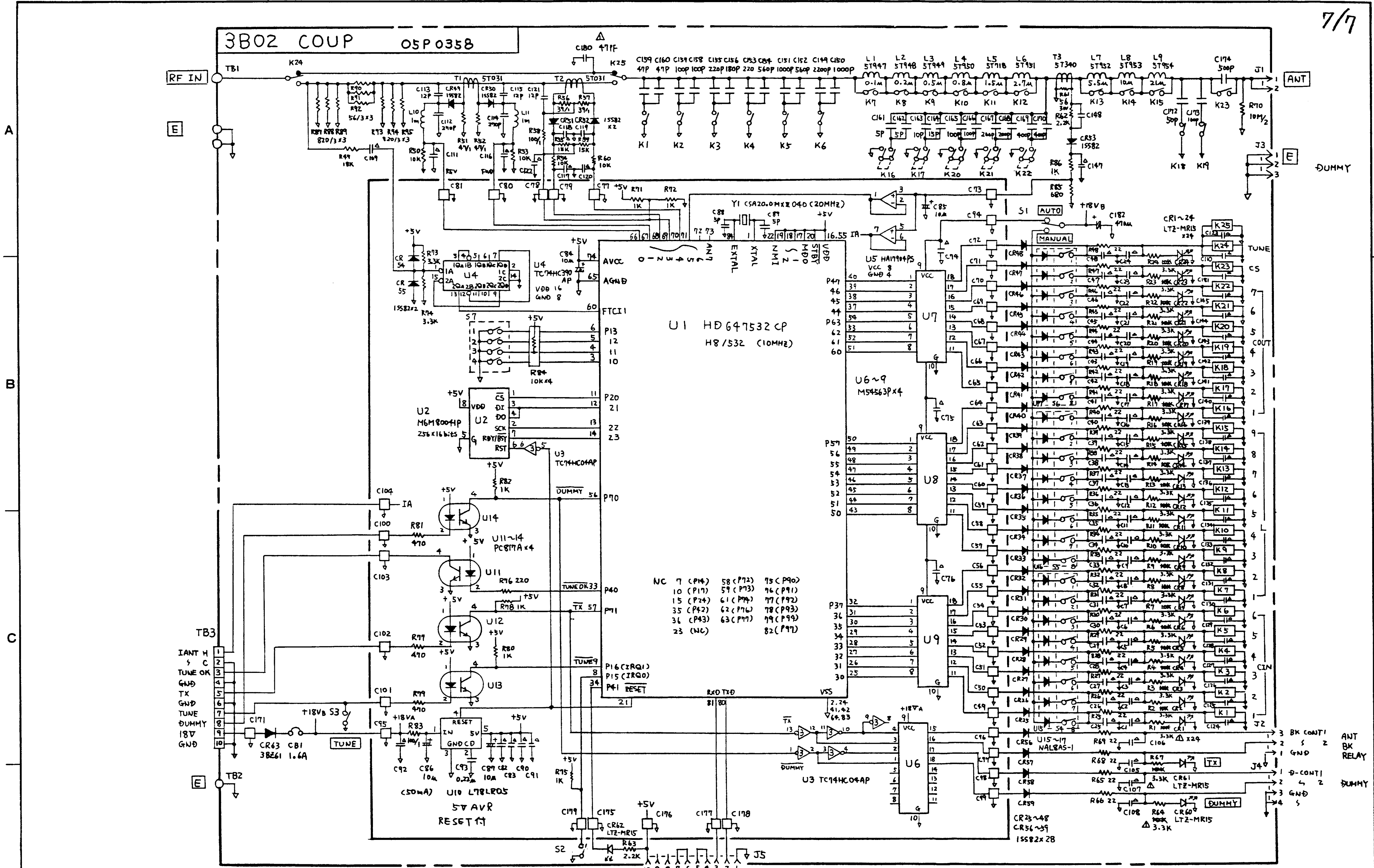
主機種	コード	型名	SHEET NO.
FS-5000 / FS-2500 / FS-1600			1/1

課長	検図	設計	製図
	89 10 11 迫田	89.10.9 家城	89.10.9 家城

分類 / 名称: 3B01 CHASSIS (COUPLER UNIT)

図番: 05-001-3334-4

古野電気株式会社



NOTE (1) Resisters are in Ω (0.16w), Capacitors are in F, Inductors are in H, unless otherwise noted.

(2) Mark △ are 0.1 μF/25 WV Capacitors and ⏚ are 0.01 μF/16 WV Capacitors with beeds core.

変更通知書番号	符号	訂正年月日	訂正記事	担当
	△	. .		
	△	. .		
	△	. .		
05E3-1812	△1	4.3.13	LED輝度, 校正回路の保護	山本 ×4
05E3-1775	△0	3.12.2	新図	山本

主機種	コード	型名	SHEET NO.
FS-5000 / FS-8000			1/1

課長	検図	設計	製図	分類	名称	図番
開発部 3.12.10 大島	村田 '93 4 9	3-11-30 山本			3B02 COUP	05-001-3443-1

古野電気株式会社

FURUNO

Information

NO. : FQ5-92-020

Date : 1992 - 7

Issued by : FURUNO ELECTRIC CO., LTD.
QUALITY ASSURANCE DEPARTMENT

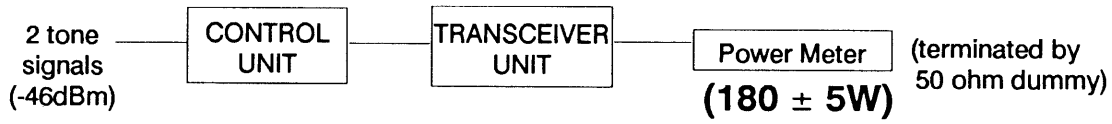
Addenda No. 21 to Service Manual of FS-5000 SM-E5519

①

FS-5000/8000
Change of ALC Adjustment

FS-5000 ②

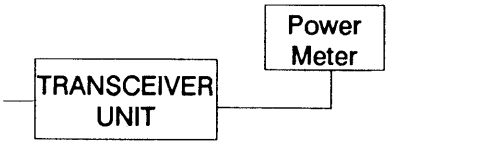
Since the EXC board was modified in January 1992, ALC adjustment at factory has been changed as follows.



③

Please amend page 2-14 of the FS-5000 Service Manual. ④

Previous



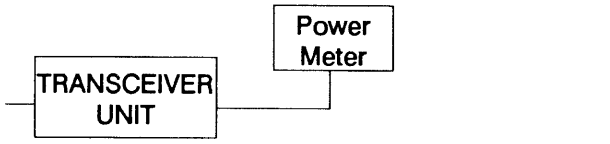
Procedure

1.

2. Turn R9 ... indicates **240W**.

3. Adjust it for meter indication of **200W**.

New



⑤

Procedure

1.

2. Turn R9 ... indicates **190W**.

3. Adjust it for meter indication of **180W**.

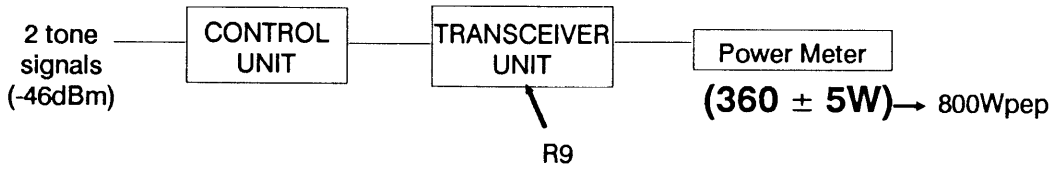
⑥

⑦

⑧

FS-8000

R9 (ALC) on the EXC board is adjusted at factory as below.



Procedure

Adjust R9 for power meter indication of 360W.

FURUNO

Information

NO. : FQ5-92-025

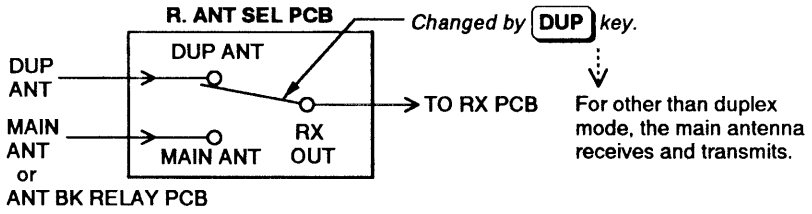
Date : 1992 - 9

Issued by : FURUNO ELECTRIC CO., LTD.

Addenda No. 22 to Service Manual FS-5000 SM-E5519

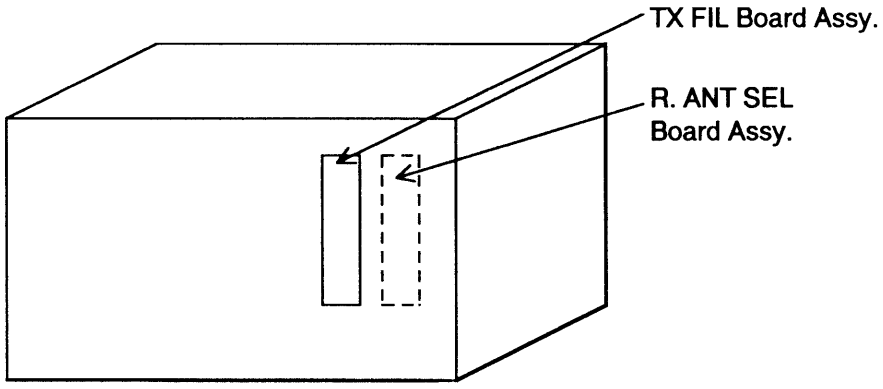
FS-5000/8000 Optional R. ANT SEL Board

Some ships which use duplex communications may have a very long coax. cable for receiving antenna. This condition greatly lowers receiving sensitivity on MF band communications over modes other than duplex. To solve this problem, the R. ANT SEL Board is now optionally available.



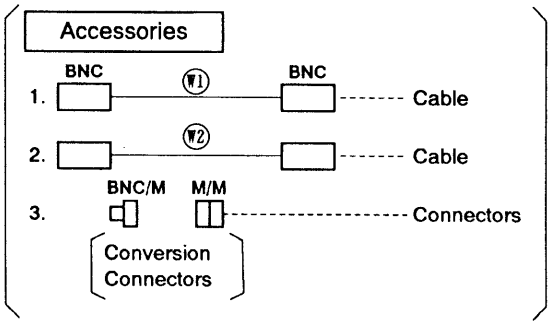
Part	Type	Code No.
R. ANT SEL Board Assy	OP05-53	005-861-350

This board is installed next to the TX FIL Board inside the transceiver unit.



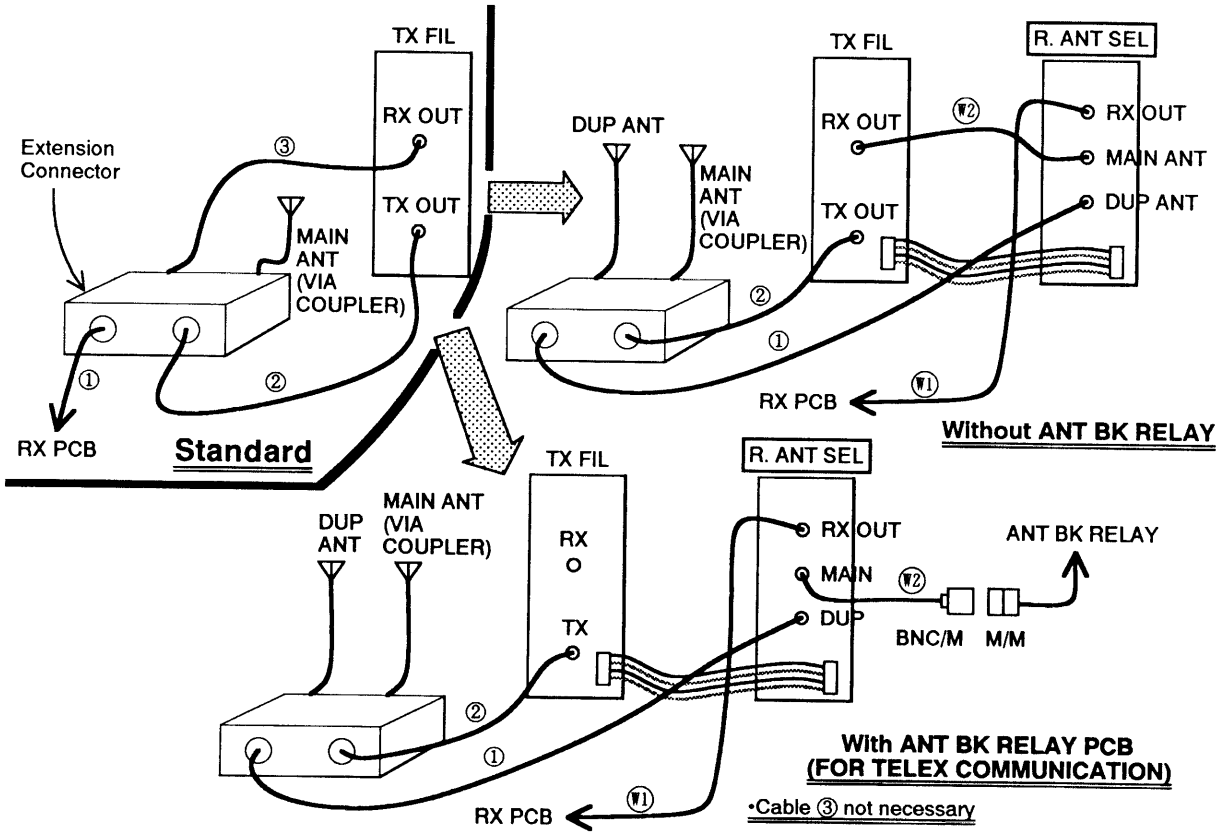
Transceiver Unit

The following accessories are supplied to connect the R. ANT SEL Board to the unit.

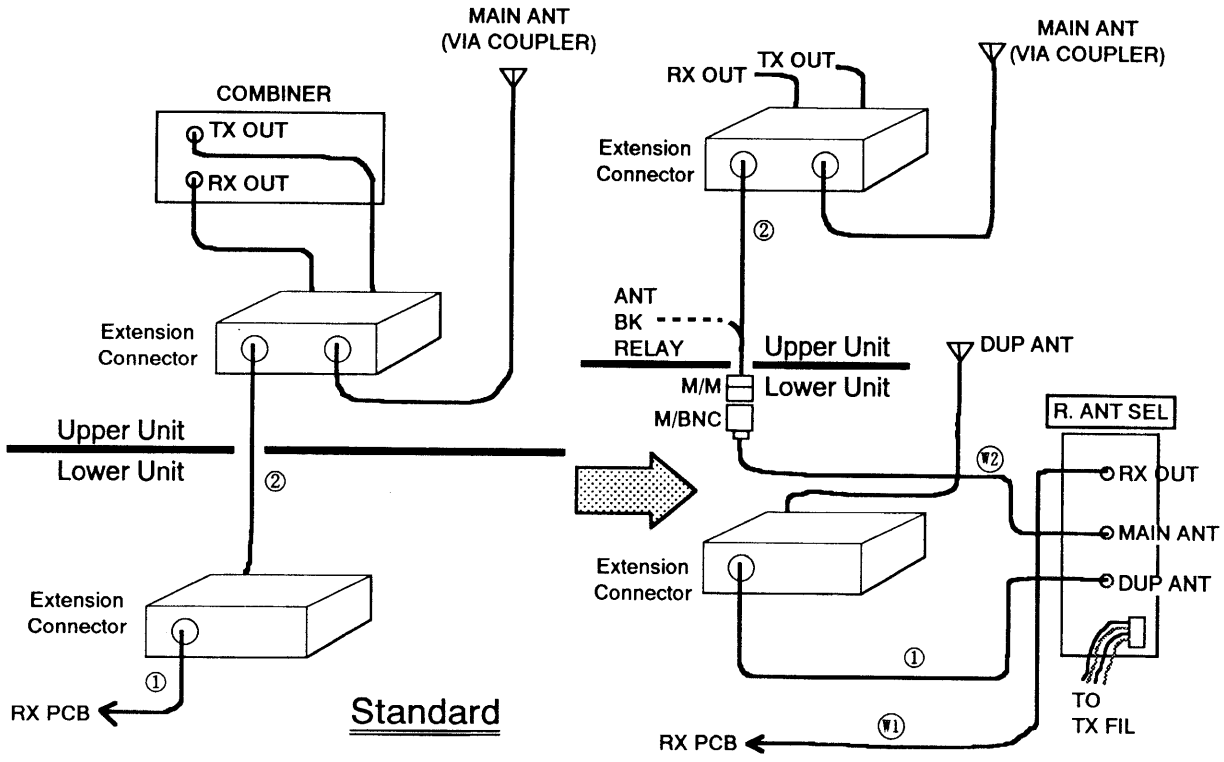


Interconnection

1. FS-5000



2. FS-8000



FURUNO

Information

NO. : FQ5-92-034

Date : 1992 - 12

Issued by : FURUNO ELECTRIC CO., LTD.
TECHNICAL DOCUMENTATION SECTION

Addenda No. 23 to Service Manual FS-5000 SM-E5519

FS-1600/2500/5000/8000 ROM Program Change (Ver. 11)

Contents of Modification (Version 10→11)

1. Additional System Settings

Channel No.	Function	Setting			
		0	1	2	3
9916	Selection of [*] key function	**not used**	key lock	intercom call	—
9951	Receiving antenna on telex communication (Only when optional R ANT SEL board is installed.)	**used**	not used	—	—
9957	Cypher communication	**disable**	enable	—	—
9962	MF (405—526.5kHz) band for TX	**not used**	used (Note 1)	—	—
9963	User programming	**enable**	disable	—	—
9964	Check meter indication for both upper and lower transceiver units (FS-8000 only)	**no**	yes	—	—

Factory Setting

Note 1: Optional antenna coupler AT-410 (under development) is required.

2. Intercom function added.
(Set channel 9916 to "2" to use the [*] key for intercom call.)
Note that the AF board 05P0356-33 in the Control Unit is required.
(This board is under development.)

3. Low power data changed.

	MF band	HF band
FS-5000	100⇨115	100⇨110
FS-8000	70⇨90	70⇨75

4. TX tuning error indication added.
Error indication "TX TUNE is off" appears when [TX TUNE] key is pressed with system setting 9905 ([TX TUNE] key function) set to "OFF".

Modified Sets

From the production in November 1992.

ROM Code Number

Type: PROM 0550131111 Code No.: 005-927-440

FURUNO
Information

NO. : FQ5-93-001
Date : 1993 - 02
Issued by : FURUNO ELECTRIC CO., LTD.
TECHNICAL DOCUMENTATION SECTION

Addenda No. 24 to Service Manual of FS-5000 SM-E5519

M. Mack.

①

FS-5000/8000
ROM PROGRAM CHANGE

②

The program of the ROMs (three) in the Control Unit, Transceiver Unit and Antenna Coupler has been changed as follows from the production of February 1992.

Unit	Control	Transceiver	Antenna Coupler
ROM Version No.	1.12 (CPU board)	Same as left.	1.02 (COUPLER board)
Program No.	05-501-31-112		05-501-54-102
Code No.	005-927-440-00		005-860-330-00

③

Modification

④

ROMs for Control and Transceiver Units (Ver. 1.12)

(1) When the circuit of the EXC board (05P0349) was changed to "suffix-33" in January 1992 to reduce transmission noise on duplex communication (refer to Furuno Information FQ5-92-009 issued in April 1992), tuning power of the FS-8000 was reduced, which caused tuning error. To resolve this problem, the tuning power of the FS-8000 has been increased.

⑤

(2) A terminal board on the INTERFACE board (05P0354) was newly added for detection of the AC mains failure in December 1992. For the sets produced in December 1992 and after (incl. RC-5000/8000 series):

⑥

1. The software bug, that the output power is not always reduced automatically when AC mains cuts off, has been removed. (RC-5000/8000 series only)

2. Automatic power reduction data (power data) when AC mains fails can be adjusted as shown below.

⑦

- [STO] → [LOW] → press and hold [LOW] or [FULL] → [ENT]

(For previous ROM, the above data was determined by maximum power data setting.)

⑧

(3) The minimum output power, when system setting 9928 ([STO] 9928) is set to "1" (60W or higher), is increased to get 60W power securely.

When you select system setting 9928 to "1", the minimum power data is automatically set as below, and the maximum power data is preset to the default setting ("255").

Model	Minimum Power Data
FS-5000	MF: 115, HF: 110
FS-8000	MF: 90, HF: 85

(4) For system setting 9980, when "31" (Netherlands) is entered, system setting 9901 is automatically set to "3" (Marine free).

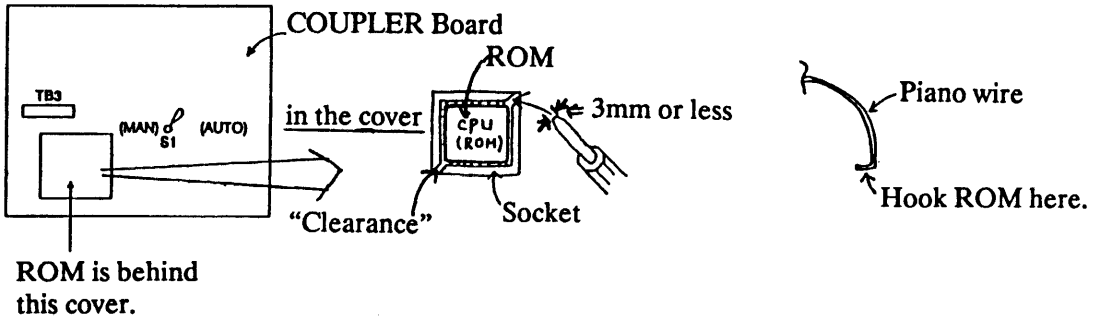
ROM for Antenna Coupler (Ver. 1.02)

(1) The software bug described below has been removed.

The "Tuning error" occurs on the frequency higher than 3.36 MHz. This is because the pi-network tuning sequence is skipped (software bug) if the gamma-network cannot be tuned.

How to remove ROM on the COUPLER board

Using a slotted-head screwdriver (blade width 3mm or less), remove ROM by inserting it into "clearance" between ROM and socket as shown below. (Piano wire may be used instead of a screwdriver.)



Relationship between Model & ROM to be replaced

Model	ROM to be replaced
RC-5000/8000 series	All ROMs (Three ROMs)
FS-8000 in which tuning error occurs.	
FS-5000 in which tuning error occurs.	ROM in the antenna coupler only.

FURUNO

Information

NO. : FQ5-93-012

Date : 1993 - 04

Issued by : FURUNO ELECTRIC CO., LTD.
TECHNICAL DOCUMENTATION SECTION

Addenda No. 25 to Service Manual of FS-5000 SM-E5519

M. Mack

①

FS-5000/8000
1. Protection of PA Transistors
2. Installation of ANTENNA EARTH RELAY Board (for Grounding TX Antenna)

②

1. Protection of PA Transistors (Overcurrent protection: max. 21A)

③

Excessive current may flow into the PA transistors momentarily when the matching status between an antenna and a coupler changes, damaging the transistors. To solve this problem, the PA CHECK board has been changed from 12/92. (The new PA CHECK board (05P0367-22) detects current flowing into the PA transistors and delivers its output to the ALC circuit of the EXC board.)

④

The next page shows how to mount and adjust the new PA CHECK board locally. This modification can be done for the sets having suffix number shown below. (Production in 11/92 and earlier)

⑤

INTERFACE board: 05P0354-11
INTERFACE board: 05P0362-11 (FS-8000)
PA CHECK board: 05P0367-11

2. Installation of ANTENNA EARTH RELAY Board

⑥

To connect a transmission antenna to ground automatically while the unit is not transmitting, install the ANTENNA EARTH RELAY board in the antenna coupler. This protects the transmission circuit against lightning when the 50 ohm BK relay in the TX FIL board is turned on, that is, the transmission circuit is connected to the antenna. The procedure for installation is on page 6/8.

⑦

Applicable equipment: Units using new antenna coupler
(Serial No. 1001 and after)

⑧

Modification for protection of PA transistors (For FS-5000)

		Qty
Necessary Parts:	1. New PA CHECK Board	1
	2. PH Connector Assy. (2P-10P)	1
	3. Carbon Resistor (680, 1/6W)	1

Procedure

Before replacing the PA CHECK board, measure the Ic current, using the existing PA CHECK board.

Conditions

Frequency	: 4MHz (SSB)
Output Power	: LOW1
Tone	: Single tone
	[STO] [9926] [ENT] [0] [ENT]
Ic Indication	: ON
	[STO] [9910] [ENT] [1] [ENT]

1. Turn off the power and replace the PA CHECK board with new one.

2. Turn on the power and measure the Ic current using the same conditions mentioned above.

3. Compare both values of Ic. If they are not the same, adjust R4 on the new PA CHECK board for coincidence.

4. Turn off the power and connect a PH connector assembly between J4 on the PA CHECK board and J9 (ALC terminal) on the INTERFACE board.

5. Change resistance value of R146 on the EXC board from 3.3k ohms to 560 ohms by inserting a 680 ohm resistor in parallel with R146.

6. Turn on the power, set the output power to FULL and transmit by single tone (SSB) on all bands.

7. Confirm that Ic indication does not exeeds 21A on all bands. If it exceeds 21A, adjust R35 (clockwise) on the PA CHECK board.

8. Restore "Tone" and "Ic Indication" system settings to previous settings.

Modification for protection of PA transistors (For FS-8000)

		Qty
Necessary Parts:	1. New PA CHECK Board	2
	2. PH Connector Assy. (2P-10P)	2
	3. PH Connector Assy. (10P-)	2
	4. Carbon Resistor (680, 1/6W)	1
	5. ROM (Ver. 1.11 or 1.12)	2

Procedure

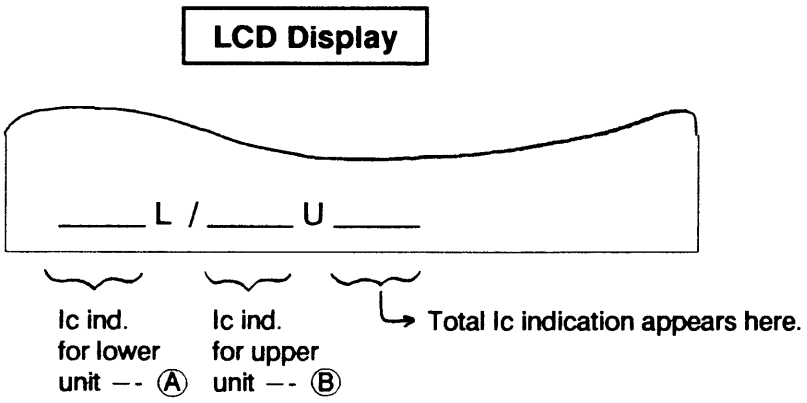
1. Replace ROMs on the CPU board in the control unit and transceiver unit with new ones. (Ver 1.11 or 1.12)

2. Turn on the power and change the system setting **9964** as shown below, to display respective Ic indication of the upper and lower units.

   [STO] [9964] [ENT] [1] [ENT]

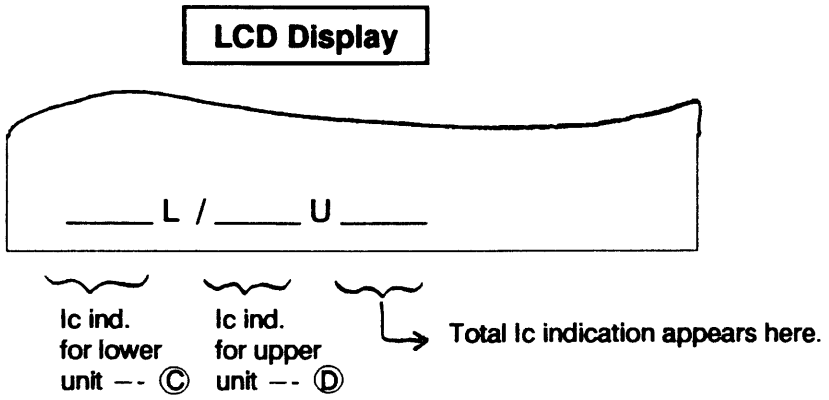
3. Before replacing the two PA CHECK boards, measure Ic current of both the upper and lower units using the existing PA CHECK board.

   Conditions
   Frequency :4MHz (SSB)
   Output Power :LOW 1
   Tone : Single tone
   [STO] [9926] [ENT] [0] [ENT]
   Ic Indication : ON
   [STO] [9910] [ENT] [1] [ENT]



4. Turn off the power and replace the PA CHECK boards with new ones.

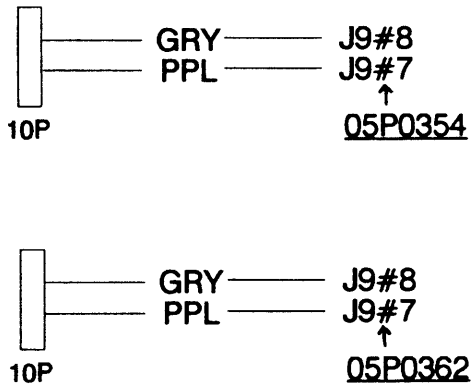
5. Turn on the power and measure the Ic current of both the upper and lower units using the same conditions mentioned earlier.

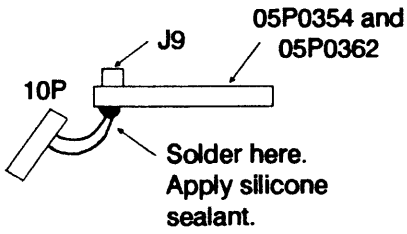


6. Compare values of Ⓐ and Ⓒ. If they are not the same, adjust R4 on the new PA CHECK board in the lower unit.

7. Adjust R4 on the new PA CHECK board in the upper unit if the values of Ⓑ and Ⓓ are not the same.

8. Turn off the power and solder two flying wires from a PH connector assembly (10P-) to J9 on the INTERFACE boards (05P0354 and 05P0362) as shown below.





9. Connect a PH Connector assembly (2P-10P) between J4 on the PA CHECK board and 10P connector from the INTERFACE board (05P0354) in the lower unit, and between J4 on the PA CHECK board and 10P connector from the INTERFACE board (05P0362) in the upper unit.

10. Change resistance value of R146 on the EXC board from 3.3k ohms to 560 ohms by inserting a 680 ohm resistor in parallel with R146.

11. Turn on the power, set the output power to FULL and transmit by single tone (SSB) on all bands.

12. Confirm that Ic indication does not exceed 21A on all bands (for both lower and upper units). If it exceeds 21A, adjust R35 (clockwise) on the PA CHECK board.

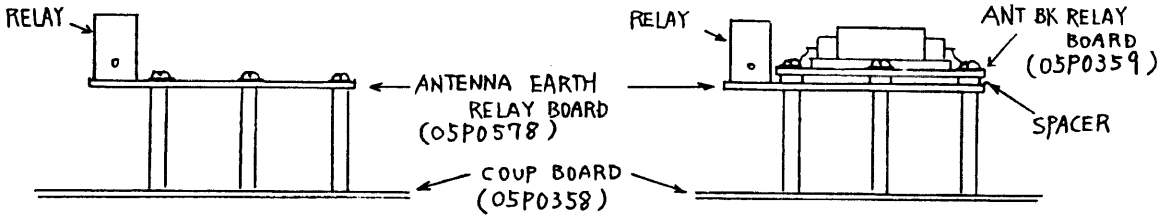
13. Restore the system settings to the previous settings.

Mounting ANTENNA EARTH RELAY PCB on Antenna Coupler (New Coupler)

		Q'ty
Necessary Parts:	① ANTENNA EARTH RELAY PCB (05P0578, with cables)	1
	② Spacer for mounting ANT BK RELAY PCB	5
	③ CK clamp (CK-05H)	1
	④ Panhead screw B (M3 × 10)	5

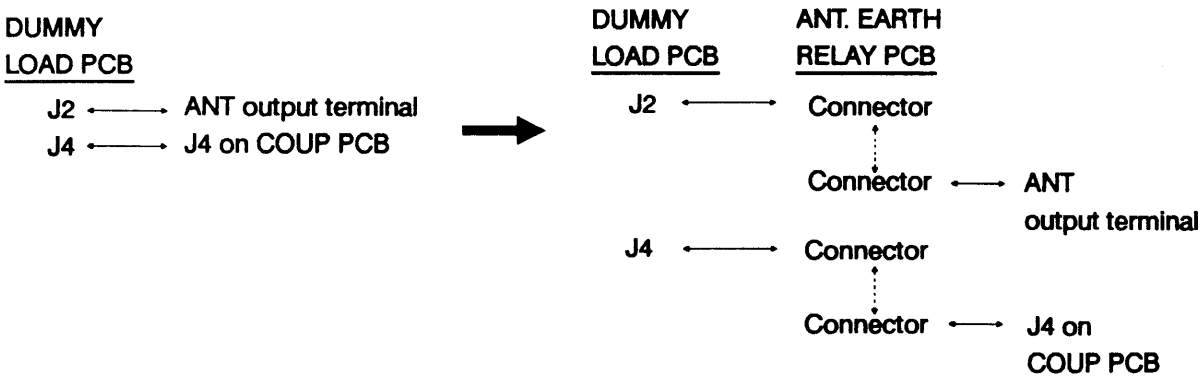
Procedure

1. Mount the board on the COUPLER board by using screws and spacers (if necessary).



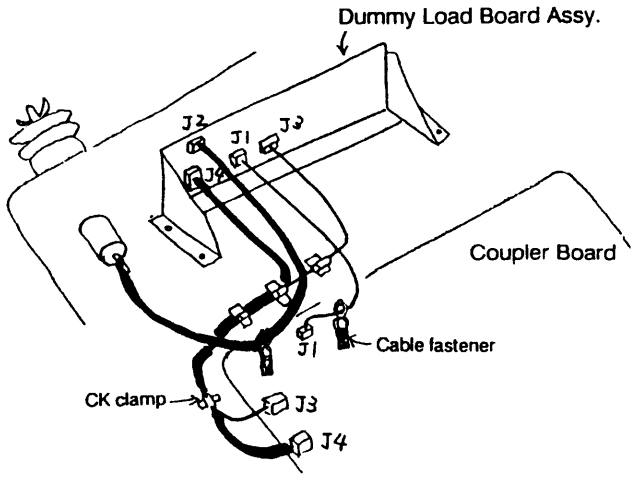
Without ANT BK RELAY PCB　　With ANT BK RELAY PCB

2. Change wire connections as shown below.

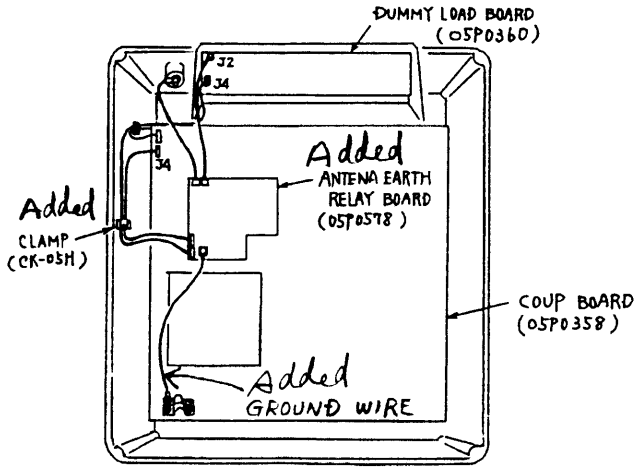


(*) Connect ground wire as shown on the next page.

Previous　　**New**



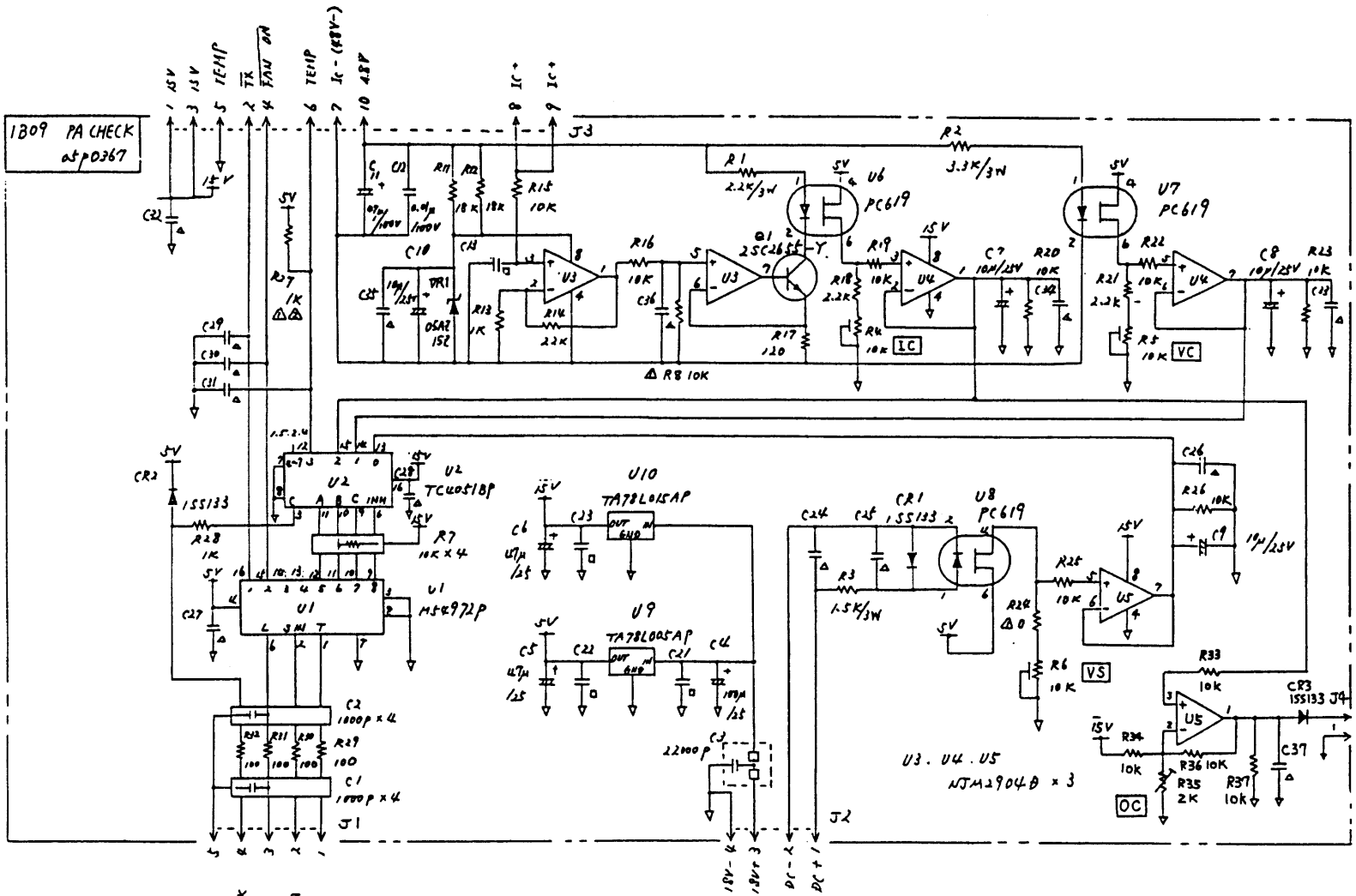
Previous



New

Operation: When the DUMMY key is on or the power is turned off, a transmission antenna is automatically connected to ground to protect the transmission circuit in the transceiver unit against lightning.

PA CHECK BOARD



NOTE (1) Resistors are in Ω(0.1W), Capacitors are in F, Inductors are in H, unless otherwise noted.
(2) Marks ○ are 1000pF/50WV capacitors.
△ are 0.01μF/50WV capacitors and
□ are 0.1μF/25WV capacitors.

主機種	FS-1600 FS-2500 FS-5000	コード		SHEET NO.	1/1
		型名			
課長	検図	設計	製図	TITLE	1809 PA CHECK (TRANSCEIVER UNIT)
				DWG No.	C5519-K07-D

古野電気株式会社

FURUNO

Information

No. : FQ5-93-016

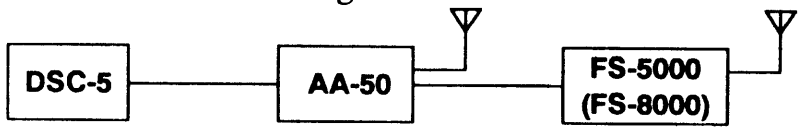
Date : 1993 - 05

Issued by: FURUNO ELECTRIC CO., LTD.
TECHNICAL DOCUMENTATION SECTION

Addenda No.26 to FS-5000 SM-E5519.
Addenda No.3 to FS-8000 SM-E5521.
Addenda No.2 to DSC-5 SM-E5522.

FS-5000/8000 series, DSC-5 Remedy for Key Lock up

The keyboard of the FS-5000/8000 and/or the SCAN key of the DSC-5 may lock when equipment is connected as shown in the figure below.



Symptom

The keyboard of the FS-5000/8000 and/or the SCAN key of the DSC-5 may lock when the AA-50 detects a dot pattern while the FS-5000/8000 scans the DSC frequency through the DSC-5 (preselector: ON).
(To restart operation, turn the power switch or the breaker off and turn it on again.)

Cause

Software bug.

Local Remedy

Replace three ROMs.

Name	Type	Code no.	Qty
FS-5000	05501-31-113 (Ver. 13)	005-927-440-02	2
DSC-5	05501-39-115 (Ver. 15)	005-996-140-02	1

Contents of ROM Change

Refer to the following Furuno Information.
•FS-5000/8000 ROM Program Change
•DSC-5 ROM Program Change

Urgency

Immediately replace ROMs when returning to port.

Factory Modification

From the production in May 1993.

Factory Modification From the production in May 1993.

Urgency Replace ROM immediately in case of item (1).

Program Number 05501-31-113

Code Number 005-927-440-02

Remarks For the RC-5000/8000 radio console sets having ROM version number 11 or earlier, adjust automatic power reduction data (minimum power data) after replacing ROM, referring to Furuno Information FQ5-93-001 issued in March 1993.

Applicable Operator's Manual for Version No. 13:
OM-E5519-0K (FS-5000)
OM-E5521-0F (FS-8000)

FURUNO

Information

No. : FQ5-93-015
Date : 1993 - 05
Issued by: FURUNO ELECTRIC CO., LTD.
TECHNICAL DOCUMENTATION SECTION

Addenda No. 27 to FS-5000 SM-E5519
Addenda No. 4 to FS-8000 SM-E5521

FS-5000/8000 ROM PROGRAM CHANGE (Ver. 13)

Contents of ROM Change

(1) In the series connections of the DSC-5/AA-50/FS-5000 (8000), the keyboard of the FS-5000 may lock when the FS-5000 scans the DSC frequency through the DSC-5 with the PRESELECTOR key turned on. This software bug has been removed.

(2) System setting 9952 is added.

[STO]→ [9952]→ Tx antenna status at reception
(0: OFF (No change)→Default
1: ON (Connected to GND)・・(*1))

(*1) This function is available only when the Rx antenna is installed and dummy load board with antenna earth relay is mounted in the coupler.
If you want to connect the Tx antenna to ground manually (irrespective of 9952 setting), press the [DUMMY] key. (For HF band of the FS-8000, this function is operative only when the output power is selected for "Low2" or less.)

⑤ 無線

(3) Tuning is automatically done when pressing the PTT switch after turning on or off the [DUMMY] key.

(4) If sensitivity setting is less than "7", the AGC and sensitivity settings are automatically changed to "ON" and "maximum", respectively when the [2182] or [2187.5] key is pressed or the "DR" command from other equipment is received.

(5) System setting 9951 is amended as below.

Incorrect		Correct
[0: YES, 1: NO]	⟶	[0: NO, 1: YES]

Shading shows default setting.

ROM Replacement

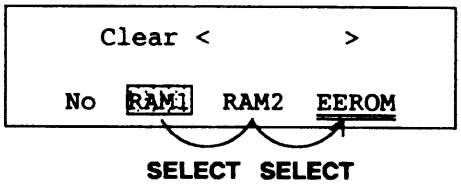
FS-5000/8000

1. Replace the ROMs on the CPU board in the Control and the Transceiver Units with new ones.

DSC-5

(Clearing EEPROM is required.)

1. Replace the ROM on the Control board.
2. Turn the power on. The following screen appears.



3. Press **SELECT** twice to advance the cursor to "EEPROM."
4. To print out the contents of the EEPROM, press **0**. The ship's ID number, "COMM" setting, etc. will be printed.
5. Press **ENT** to clear the contents of the EEPROM.
6. Restore the system settings as they were before.

FURUNO

Information

No. : FQ5-93-017
Date : 1993 - 06
Issued by: FURUNO ELECTRIC CO., LTD.
TECHNICAL DOCUMENTATION SECTION

Addenda No. 28 to Service Manual FS-5000 SM-E5519
Addenda No. 5 to Service Manual FS-8000 SM-E5521

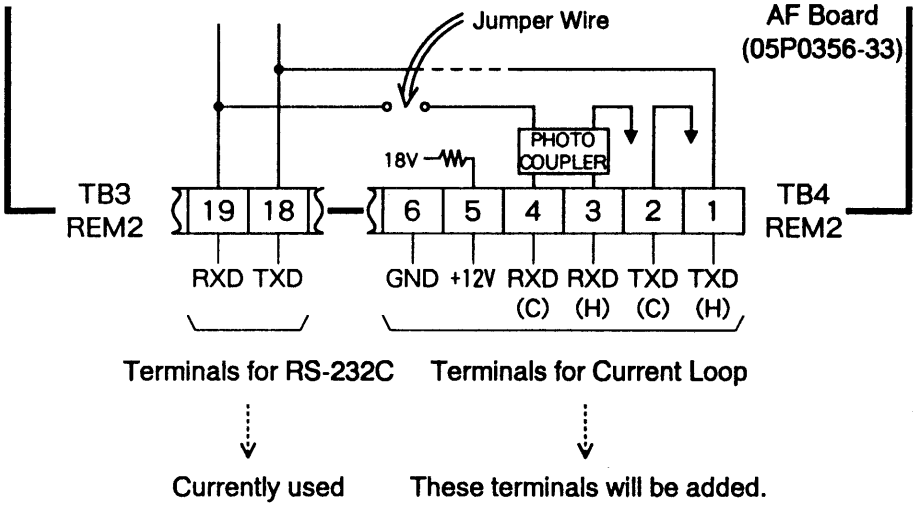
FS-5000/8000 SSB RADIOTELEPHONE
New Version AF Board (-33)

The FS-5000/8000 will have a new version AF Board from the production in August 1993. The new version no. is 05P0356-33. This technical information describes the changes made to this board.

Changes

Connection of Remote Station RB-500

1) The new version AF Board has terminals for **current loop.** They are on the REM2 terminal and are connected as follows.

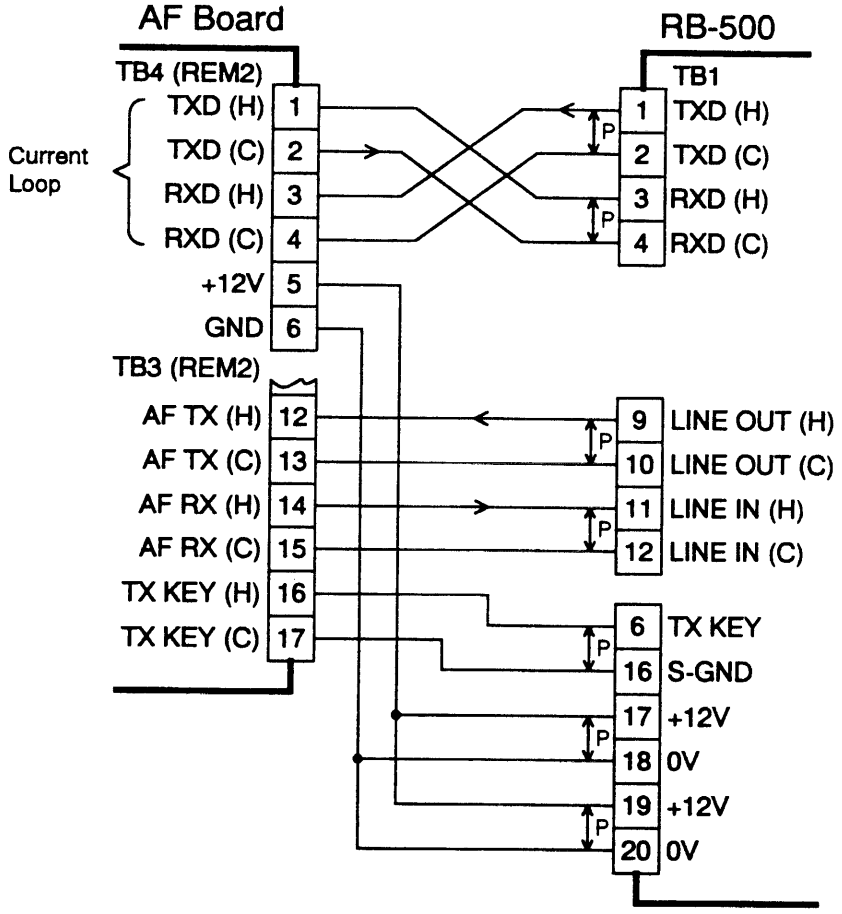


The new version AF Board has the terminals for current loop (TB4 #1–#4). Because of the addition of those terminals, the terminals for connection of CIF/NMEA will be changed from TB4 #1–#4 to #7–#10.
You set the data format of equipment connected to the REM2 by jumper wire, as shown in the table below.

Jumper Wire (see drawing on page 4/6)	Format
Short	Current Loop
Open (factory setting)	RS-232C

2) As shown in the illustration on the previous page, + 12 V power for the RB-500 is taken from the #5 terminal of TB4. (Currently + 18 V is taken from the #9 terminal of TB1 and a resistor is inserted on the RB-500 to lower voltage to + 12 V.)

As the result the new version AF Board is connected to the RB-500 as follows.



3) Squelch function will be available at the RB-500. (Currently the AF signal comes to the line output (AF RX) terminal on the FS-5000 without passing through the squelch circuit. In the new version AF board it passes through the squelch circuit.)

Intercom function available with RB-500 connection

The intercom function was added to the FS-5000 in November 1992, by ROM version 1.11. No hardware was available at that time; however, the new version AF Board has an intercom circuit. You can enable the intercom function by pressing the following keys

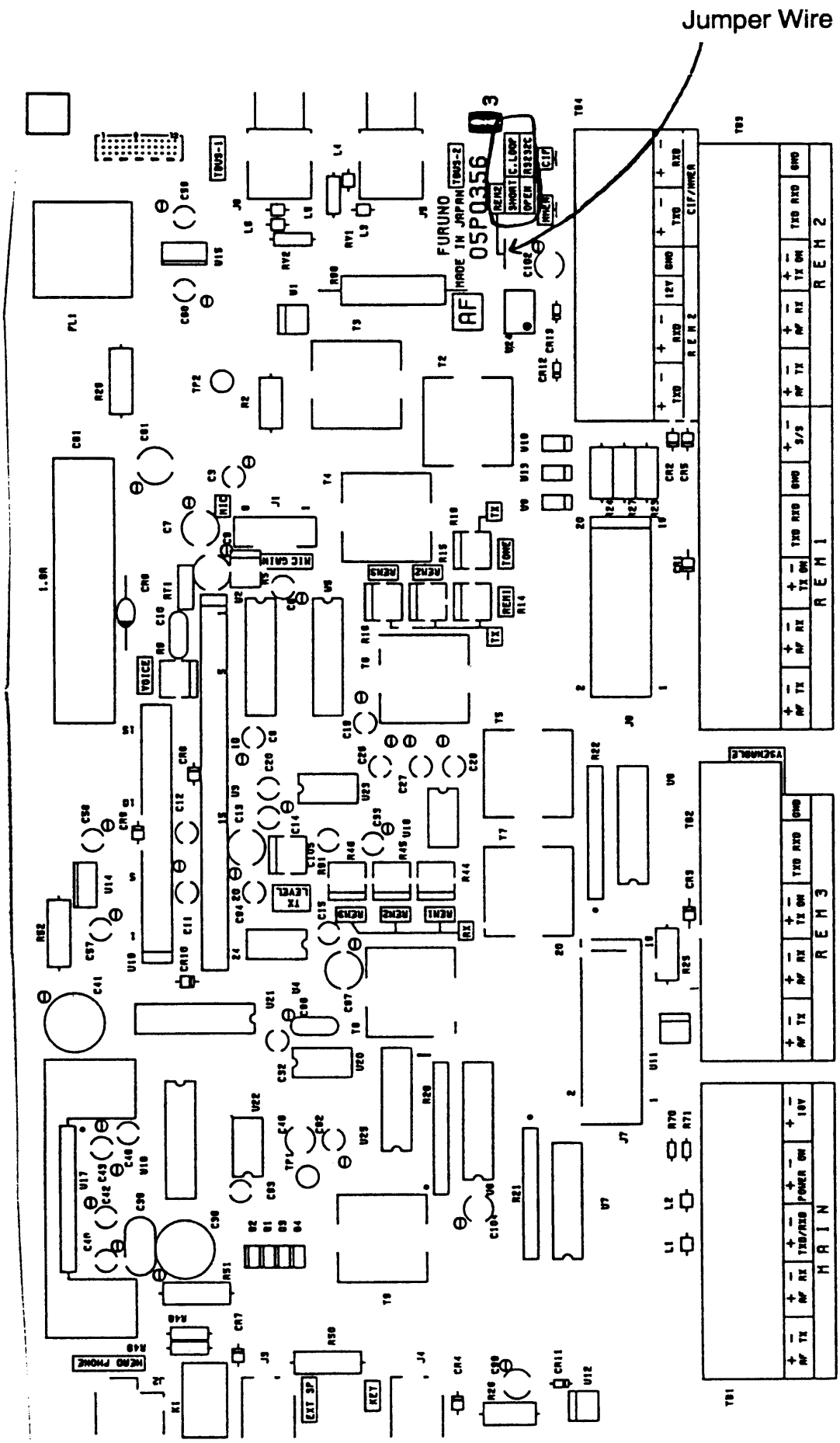
[STO] [9916] [ENT] [2] [ENT]

You operate the intercom function on the front panel by using [*], [ENT], [CLEAR] keys.

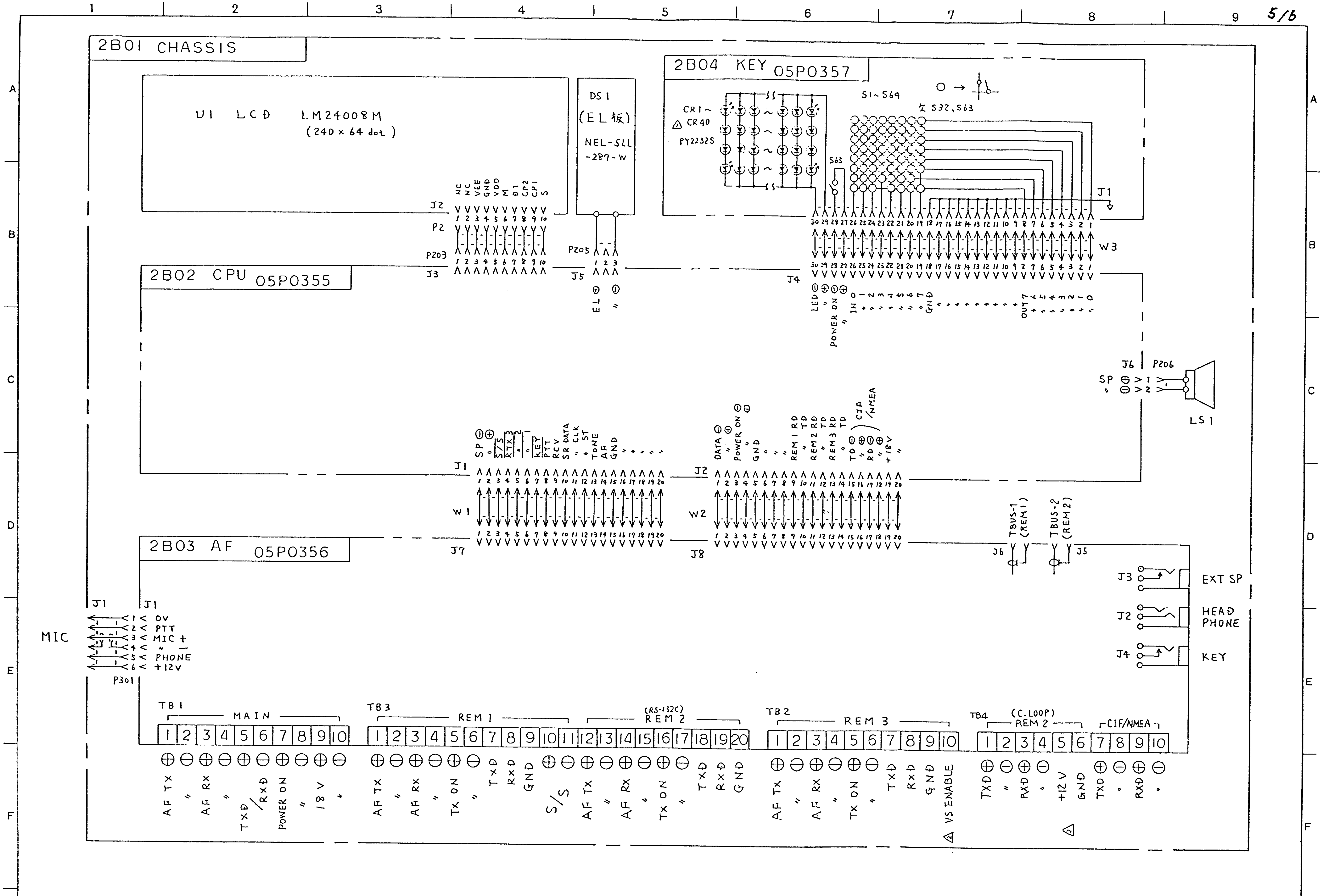
- Calling: [*], (terminal no.), [ENT], then communicate
- Ending communications: [CLEAR]
- Answering: [ENT], then communicate

Potentiometer for adjustment of MIC gain

A potentiometer for adjustment of MIC gain (R5: MIC GAIN) is added. Adjust it when MIC gain is too high.



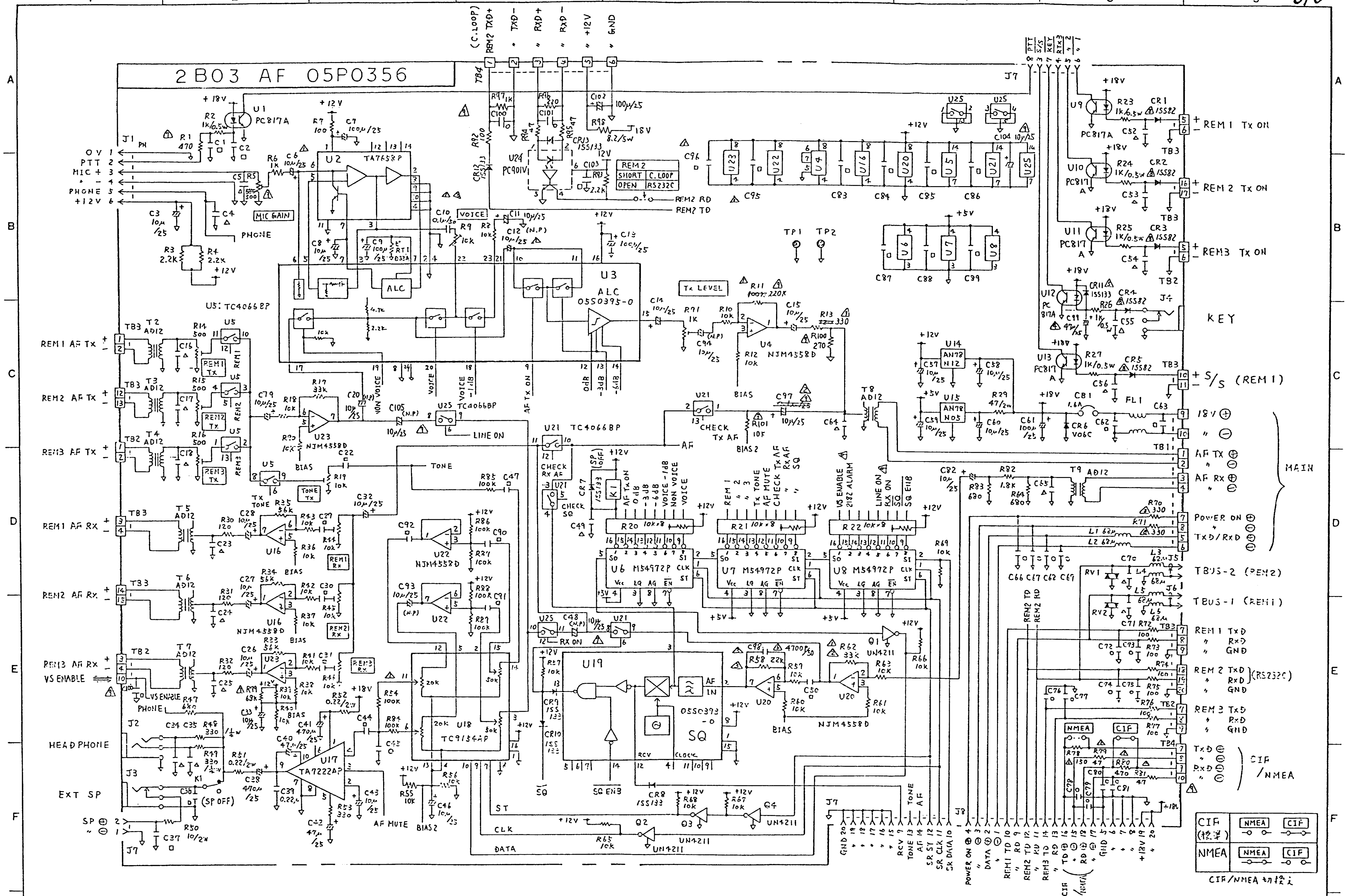
AF Board (05P0356-33)


2B01 CHASSIS
U1 LCD LM24008M
(240 × 64 dot)
DS1
(EL板)
NEL-SLL
-287-W
2B04 KEY 05P0357
CR1~
CR40
PY2232S
S1~S64
S32, S63
S65
J1
W3
J4
J2
P2
P203
J3
P205
J5
2B02 CPU 05P0355
J6
P206
SP
LS1
J1
W1
J7
J2
W2
J8
2B03 AF 05P0356
TBUS-1 (REM1)
TBUS-2 (REM2)
J3
EXT SP
J2
HEAD PHONE
J4
KEY
MIC
J1
0V
PTT
MIC +
PHONE
+12V
P301
TB1
MAIN
TB3
REM 1
(RS-232C)
REM 2
TB2
REM 3
TB4
(C.LOOP)
REM 2
CIF/NMEA
AF TX
AF RX
TXD/RXD
POWER ON
18V
TX ON
S/S
TXD
RXD
GND
VS ENABLE
+12V

	△	. .		
	△	. .		
	△	. .		
05E3-1899	△2	2.10.30	リモートハンドセット対応 他修正	迫田
05E3-1601	△1	2.5.10	LED28個→40個	山本
変更通知書番号	符号	訂正年月日	訂正記事	担当

主機種	FS-5000 / FS-2500 / FS-1600	コード / 型名		SHEET NO. 1/1
課長	検図	設計	製図	分類
1.10.12 大谷	29.10.11 迫田	29.10.3 山本	29.10.3 家城	
名称	2B01 CHASSIS (CONTROLLER UNIT)			
図番	05-001-3331-2			

古野電気株式会社



2B03 AF 05P0356
(C.LOOP) REM2 TXD+
TXD-
RXD+
RXD-
+12V
GND
J1
0V 1
PTT 2
MIC + 3
- 4
PHONE 5
+12V 6
U1 PC817A
U2 TA7658P
MIC GAIN
PHONE
U3 ALC 05S0395-0
ALC
VOICE
Tx LEVEL
U4 NJM4558D
U24 PC901V
REM2
SHORT C.LOOP
OPEN RS232C
REM2 RD
REM2 TD
TP1 TP2
U5: TC4066BP
REM1 AF Tx
REM2 AF Tx
REM3 AF Tx
REM1 AF Rx
REM2 AF Rx
REM3 AF Rx
VS ENABLE
HEADPHONE
EXT SP
SP
U16
U23 NJM4558D
U25 TC4066BP
LINE ON
U21 TC4066BP
CHECK Tx AF
CHECK Rx AF
CHECK SQ
TONE
BIAS
BIAS 2
U22 NJM4558D
U18 TC9154AP
U17 TA7222AP
AF MUTE
(SP OFF)
U6 M54972P
U7 M54972P
U8 M54972P
U19 05S0393-0 SQ
U20 NJM4558D
SQ ENB
ST
CLK
DATA
Q1 UN4211
Q2 UN4211
Q3
Q4 UN4211
U9 PC817A
U10 PC817A
U11 PC817A
U12 PC817A
U13 PC817
U14 AN78N12
U15 AN78N05
REM1 Tx ON
REM2 Tx ON
REM3 Tx ON
KEY
S/S (REM1)
18V ⊕
" ⊖
AF TX ⊕
AF Rx ⊕
MAIN
POWER ON ⊕
TXD/RXD
TBUS-2 (REM2)
TBUS-1 (REM1)
REM1 TxD RxD GND
REM2 TxD RxD GND (RS232C)
REM3 TxD RxD GND
TxD ⊖
RxD ⊖
CIF /NMEA
CIF (標準)
NMEA
CIF/NMEA 切換え

変更通知書番号	符号	訂正年月日	訂正記事	担当
05E3-1741	5 ×1	3.9.26	フォトカプラ逆電圧保護	迫田
05E3-1646	4 ×1	2.10.18	チャタリング防止 (C99)	山本
05E3-1585	3	2.3.8	Tx F特改善, スケルチ4ch改善	宮城
05E3-1566	2	2.1.12	Rxレベル訂正, Tx [illegible]	宮城
05E3-1559	1	1.11.6	誤記訂正, CIF/NMEA切換	宮城

変更通知書番号	符号	訂正年月日	訂正記事	担当
05E3-1899	9 ×15	4.10.30	リモートコントロール対応	迫田
05E3-1782	8 ×7	4.1.10	[illegible]	迫田
05E3-1752	7 ×1	3.10.21	PTT回り込み防止	山本
05E3-1742	6 ×1	3.10.2	スケルチ改善 [illegible]	迫田

NOTE
(1) Resistors are in Ω(0.1W), Capacitors are in F. Inductors are in H, unless otherwise noted.
(2) Marks ○ are 1000pF/50WV capacitors, △ are 0.01uF/50WV capacitors and □ are 0.1uF/25WV capacitors.

主機種	FS-5000	コード		SHEET NO.	1/1
		型名			
課長	検図	設計	製図	分類	名称: 2B03 AF (CONTROLLER UNIT)
	前原	山本	宮城		図番: 05-001-3333-9

古野電気株式会社

FURUNO

Information

No. : FQ5-93-023

Date : 1993 - 06

Issued by: FURUNO ELECTRIC CO., LTD.
TECHNICAL DOCUMENTATION SECTION

Addenda No. 29 to
FS-5000 SM-E5519
Addenda No. 6 to
FS-8000 SM-E5521

FS-5000/8000
Remedy for Garbled Audio

Symptom

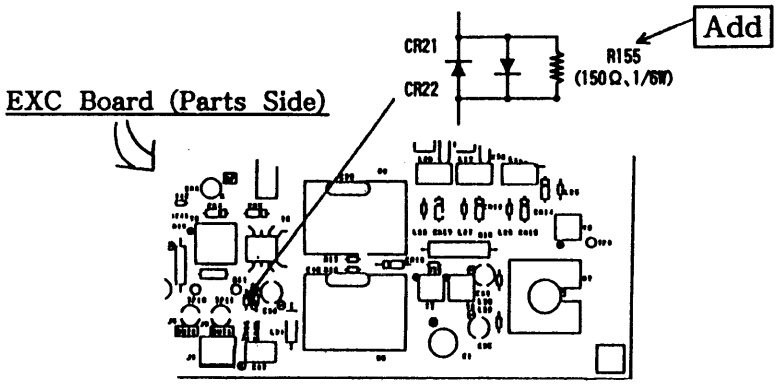
Your partner cannot hear your voice clearly.

Cause

Low level audio is cut off by CR21 and CR22 on the EXC board (05P0349-33), which were added for noise reduction (reduction of interference from own transmitter to receiver) on duplex communication, in January 1992.

Field remedy

(1) Note white noise level by pressing PTT switch on duplex mode; (2) **Add a resistor** (R155: 150 ohms, 1/6W, 000-329-017) in parallel with CR21 and CR22 on the EXC board, and (3) Compare the level of white noise with that of before modification.
White noise should increase slightly. If necessary, adjust resistance of R155; the higher the resistance (max. 220 ohms), the lower the level of the white noise on the duplex mode but the worse the clarification.



Urgency

Tick	Action
	Immediately (ask ship's captain to remedy if the ship is out)
	As soon as the ship returns to port
	When it is convenient
✓	When symptom occurs

Factory modification

From the production in July 1993.

Remarks

If the duplex mode is not used, short CR21 and CR22 to clarify voice.

FURUNO

Information

No. : FQ5-93-028

Date : 1993 - 08

Issued by: FURUNO ELECTRIC CO., LTD.
TECHNICAL DOCUMENTATION SECTION

Addenda No. 30 to
FS-5000 SM-E5519
Addenda No. 7 to
FS-8000 SM-E5521

FS-5000 Series
ROM Program Changes (Ver. 15)

Changes made to ROM program

- The following problems were eliminated.
  1. Frequency cannot be set 30 seconds to one minute after turning on the power and the error message "Tx frequency unlock" appears.
  2. Telex communication errors; NBDP terminal DP-5 cannot receive message completely, or connection is broken.

- The factory settings of the system channels were changed as follows.

System CH	Function	Factory Setting
9947	Squelch in telex mode	1 (OFF)
9948	Noise blanker in telex mode	1 (OFF)
9949	AGC in telex mode	1 (FAST)
9965	Scan response time	1 (FAST)

Program number

PROM0550131115

Note for replacement of ROM in the field

After replacing the ROM, display the system channels and set them as shown in above table.
setting procedure (key operation)

[STO] [9] [9] [ ] [ ] [ENT] [ ] [ENT]

system channel — setting

Factory modification

From the production in July 1993.

Remarks

The ROM program version number of the DP-5 is now 2.00. (It eliminates Telex Communication problems.)
We recommend that the DP-5 having new ROM (ver. 2.00) be used with FS-5000 series.

FURUNO

Information

No. : FQ5-94-002

Date : 1994 - 02

Issued by: FURUNO ELECTRIC CO., LTD.
TECHNICAL DOCUMENTATION SECTION

Addenda No. 31 to FS-5000
Service Manual SM-E5519

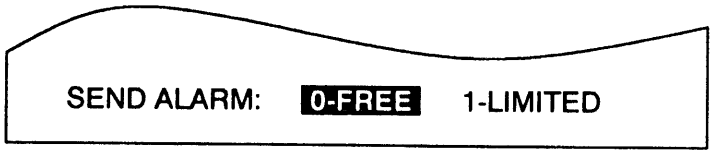
Addenda No. 8 to FS-8000
Service Manual SM-E5521

FS-5000/8000
ROM Program Changes (Ver. 17)

Changes made to ROM program

System setting 9966 is added so as to determine whether the transmission of two-tone alarm is restricted or not.

Procedure: **[STO]** → **9966** → **[ENT]**



In accordance with both the above setting and system setting 9953 (Operation on AM mode), the transmission of two-tone alarm on AM mode is as follows:

System setting 9966 Setting No.	System setting 9953 Setting No.	TX of two-tone alarm on AM mode
0 (FREE) (Factory setting)	0 (TX/RX)	Possible on all frequencies.
	1 (RX only)	
	2 (No)	Disabled
	3 (2182)	Possible on all frequencies.
1 (LIMITED)	0 (TX/RX)	Possible on all frequencies.
	1 (RX only)	Disabled
	2 (No)	
	3 (2182)	Possible on 2182 kHz only.

⑤

Program number	PROM 0550131117
Code number	005-927-440
Factory modification	From the production in Feb. 1994
Remarks	The version no. of the ROM on the COUPLER board in the antenna coupler will be changed from 03 to 05 in April 1994 (Minor change). However, ROM version no. 3 remains compatible with the transceiver unit having ROM version no. 17.

FURUNO

Information

No. : FQ5-2000-013
Date: 2000-06

Issued by: FURUNO ELECTRIC CO., LTD
SERVICE MANAGEMENT & COMMANDING DEPARTMENT

APPROVED BY
WRITTEN BY

Addenda No.32 to FS-5000 Service Manual SM-E5519
Addenda No.9 to FS-8000 Service Manual SM-E5521

FS-5000/8000
New Software (V. 21)

The Convention and the International Regulations were changed and H3E 2182 kHz watch receiver need not be fitted on board a ship after full implementation of GMDSS. Now 2182 kHz is transmitted only on J3E.

According to this change, the software for the FS-5000 was changed as follows.

New software: 05-501-31-121

Factory-modified sets
FS-5000 (Control Unit): 2508-1979 and after
FS-5000T: 3423 and after
FS-8000: From the next production

Changes to be made

1) System channel 9904 (Emission mode on 2182 kHz): "2:J3E FIX" is added.
2) System channel 9923 (Dummy): Default is changed to 1: Prohibited.
3) System channel 9953 (AM operation): Default is changed to 0: TX/RX for Japan and 1: RX for other countries.
4) System channel 9966 (Two-tone alarm TX): "2: TX prohibited" is added. Default is 0: Free for all countries. If "2: TX prohibited" is selected, regardless of 9953 setting, two-tone alarm is not emitted.
5) Two-tone alarm test with dummy load functions as follows.
   With system channel 9911 set to 1: TX, emission mode depends on the setting on 9904, and output power is Full on H3E and Low-1 on J3E.
6) GGA (NMEA sentence) is receivable.
7) With 9937 to 9939 (emission mode of TX for REMOTE) set to other than 0: No change, every time after transmission on an ITU channel by the TX KEY, tuning is made. This problem is solved.
8) With 9937 to 9939 (emission mode of TX for REMOTE) set to 1: AM, TX cannot be stopped by setting TX KEY to OFF if 9953 is set to other than 1. This problem is solved.
9) RX self-test (9914) sometimes ends with NG if AGC is set to SLOW in CW and AM modes. This problem is solved.
10) With system channel 9949 set to 1: FAST, AGC remains FAST when the mode is changed from TELEX to SSB. This problem is solved.
11) Default of MF power data (FS-2500) is changed to 200 and its upper limit to 255.

⑤
SSB

FURUNO

No. : FQ5-2004-009 1/3

Date: 2004-03

Information

Issued by: FURUNO ELECTRIC CO., LTD
SERVICE MANAGEMENT & COMMANDING DEPARTMENT

APPROVED BY Y. Yamada

WRITTEN BY K. Kawamoto

Addenda No. 33 to FS-5000 service manual, Pub. No. SME-5519
Addenda No. 10 to FS-8000 service manual, Pub. No. SME-5521

FS-5000/8000
New CPU/EXC/RX Boards

Urgency: When servicing

Three printed circuit boards, CPU, EXC, and RX are modified because the production of PLL IC, M54927P is discontinued. New CPU board recognizes EXC and RX board type, so new CPU board is used with old EXC and/or RX board without modification.

Table 1 lists type and code number of new boards and table 2 shows the compatibility between old and new boards.

Table 1 New p.c. boards

Board name	Type	Code number	Usage
CPU board	05P0347A	005521030	FS-5000T/8000T
RX board	05P0348A	005521140	FS-5000T/8000T
EXC board	05P0349B	005521160	FS-5000T
EXC board	05P0349C	005521170	FS-8000T

⑤ SSB

Table 2 Compatibility between old and new p.c. boards

Board		New transceiver	Old transceiver	Usage
New CPU	05P0347A	X	X	FS-5000T FS-8000T
Old CPU	05P0347	N.A	X	
New RX	05P0348A	X	See next page.	FS-5000T FS-8000T
Old RX	05P0348	X	X	
New EXC	05P0349B	X	See next page.	FS-5000T
Old EXC	05P0349-Z	X	X	
New EXC	05P0349C	X	See next page.	FS-8000T
Old EXC	05P0349A-Z	X	X	

Factory-modified sets

FS-2500T/5000T: 2990, 2994, and after
FS-8000T: 0279, and after

How to use new board in old transceiver

To use new EXC and/or RX board in the old transceiver, follow the procedure below.

1. Change CPU board to new one.
2. Change PROM in FS-5000C to Ver. 055013112**4**.
3. Change EXC and/or RX board with new one.
4. Connect new CPU board with new EXC (RX) board.

J7 (4P) on CPU board (05P0347A) <<<>>>> J10 (4P) on EXC board (05P0348B/C)
J8 (5P) on CPU board (05P0347A) <<<<>>> J10 (5P) on RX board (05P0348A)

Necessary parts

Parts name	Type	Code number	Remarks
PH connector assy.	PH04DK-320	000149706	RX/CPU
PH connector assy.	PH05DK-400	000149707	EXC/CPU
PROM	055013112**4**	00592744005	For FS-5000C

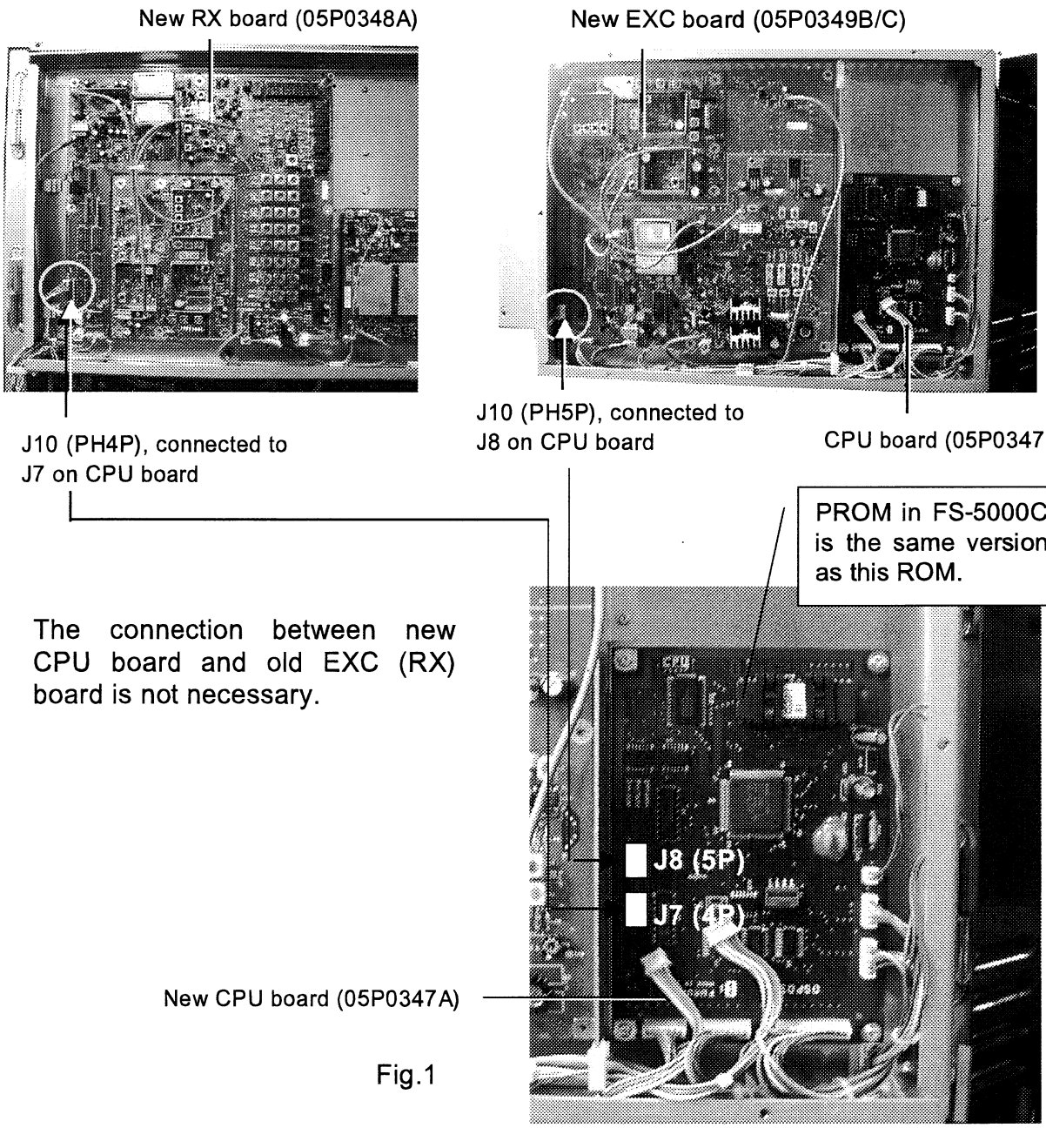


Fig.1

Automatic board recognition

Board type signal, or "p.c.b type" signal is connected to EXC and RX boards as shown in Fig. 2. The CPU sets the signal to both L and H levels and if the CPU detects the set level, the board is new.

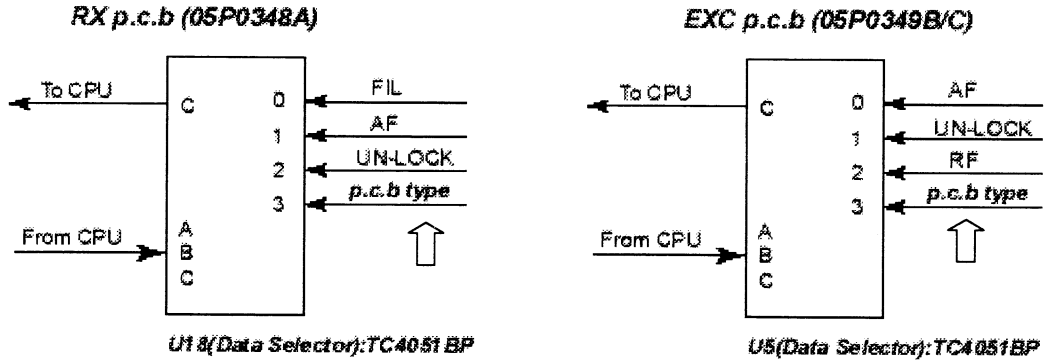


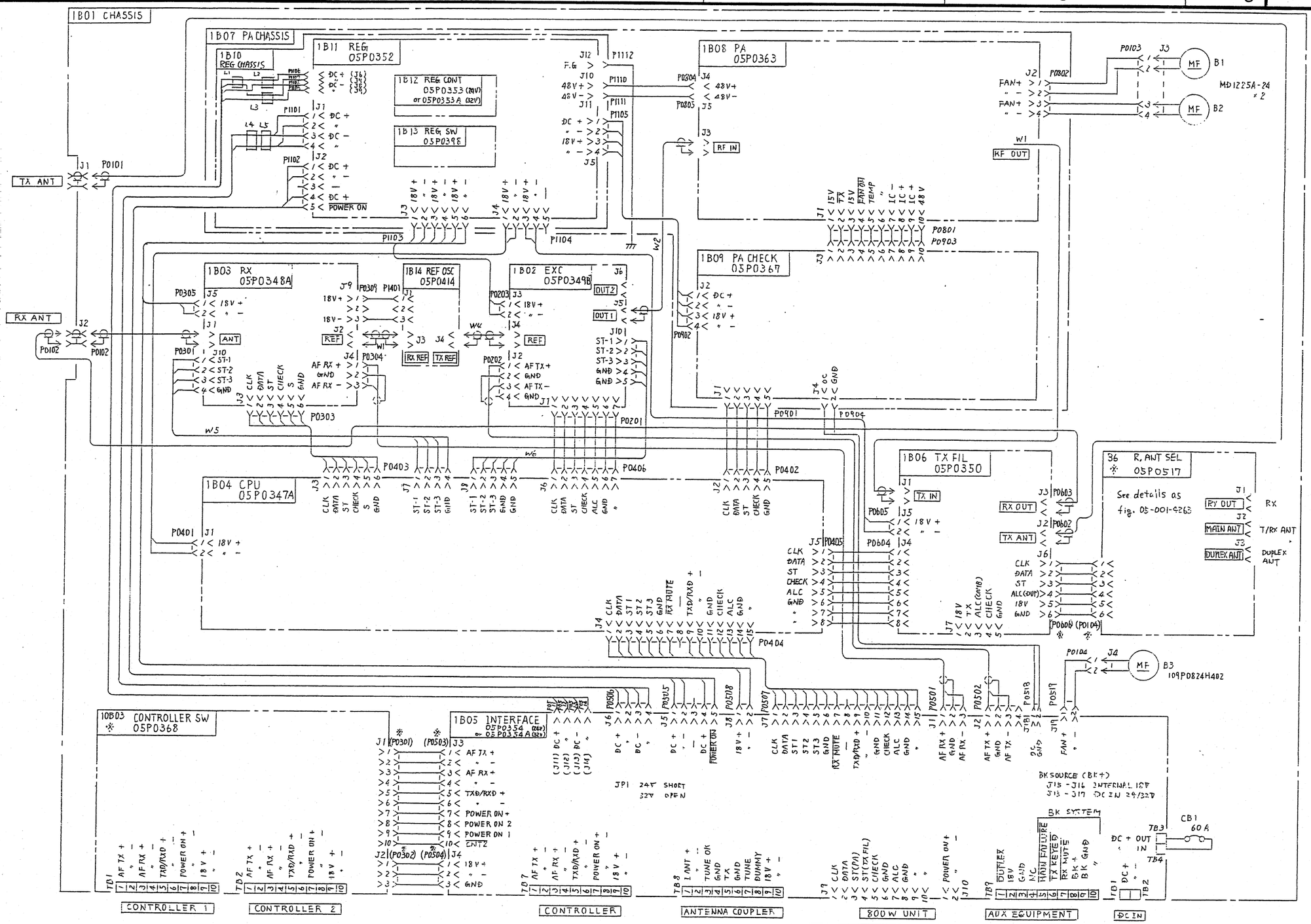
Fig. 2 "p.c.b type" signal lines on EXC and RX boards

Difference between 05P0349B and 05P0349C

The EXC board for FS-5000, 05P0349B has a 50-ohm terminator at OUT-2 port, but one for FS-8000, 05P0349C does not. With the FS-5000, the PA is connected to OUT-1 port.

FURUNO

S-1/7

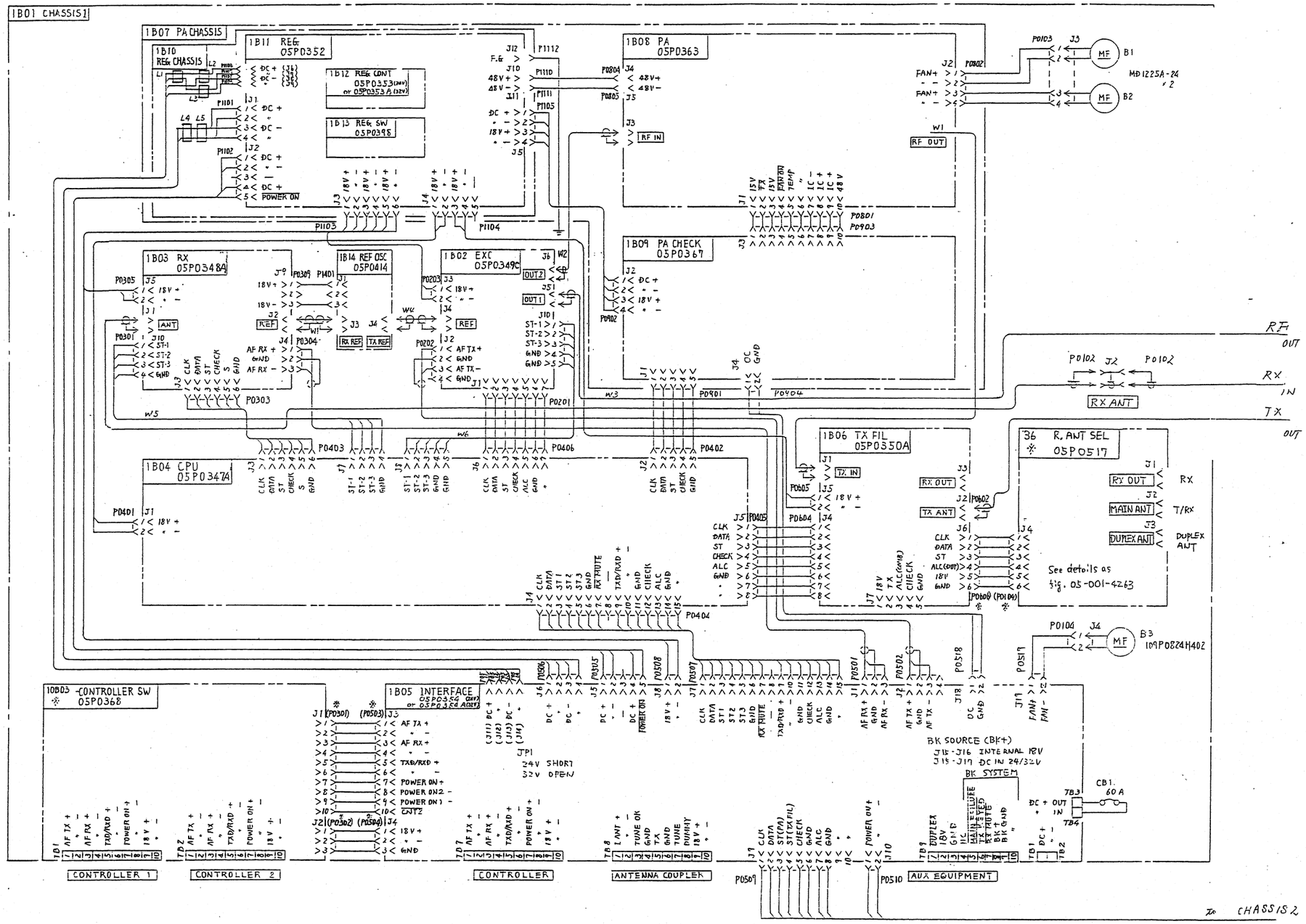


NOTE
Marks ※ are options.

DRAWN 04/03/03 T. YAMASAKI	FS-1600	TYPE	FS-5000T
CHECKED 04/08/05 T. Takeuchi	FS-2500	名称	送受信部（総合）
APPROVED 04/09/11 H. Nagashima	FS-5000 1B 01		回路図
SCALE / MASS	MODEL / BLOCK No.	NAME	TRANSCEIVER UNIT (GENERAL)
Dwg No. C5519-K12- E	05-001-3322-8		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

CHASSIS



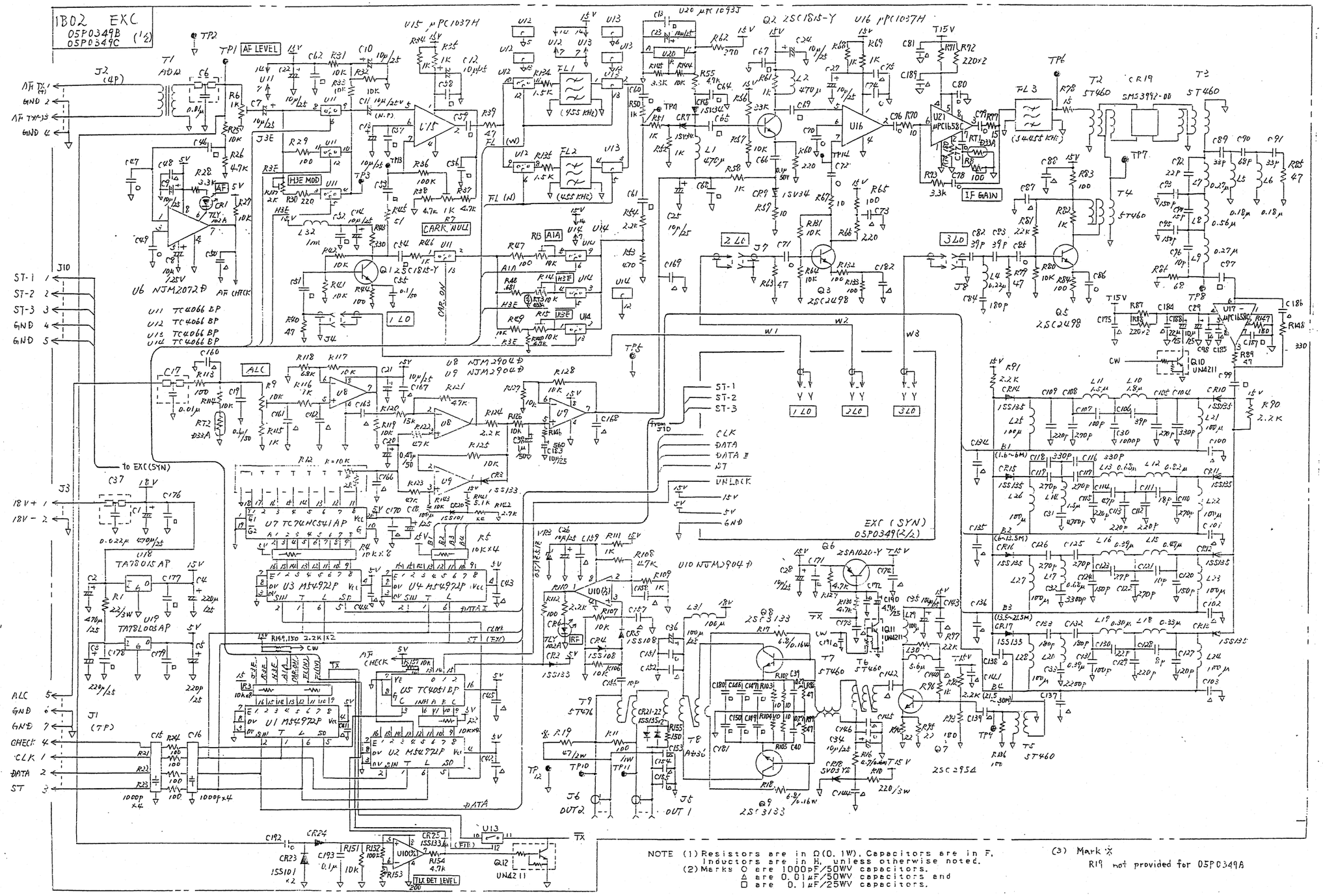
NOTE
Marks ※ are options.

DRAWN 04/03/03 T. YAMASAKI		TYPE	FS-8000T (1/2)
CHECKED 04/03/11		名称	送受信部 (下部)
APPROVED 04/03/11 H. Hayashi	FS-8000 1B 01		回路図
SCALE	MASS MODEL BLOCK No.	NAME	TRANSCEIVER UNIT (LOWER)
Dwg No. C5521-K03- C	05-001-3346-7		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO

S-3/7



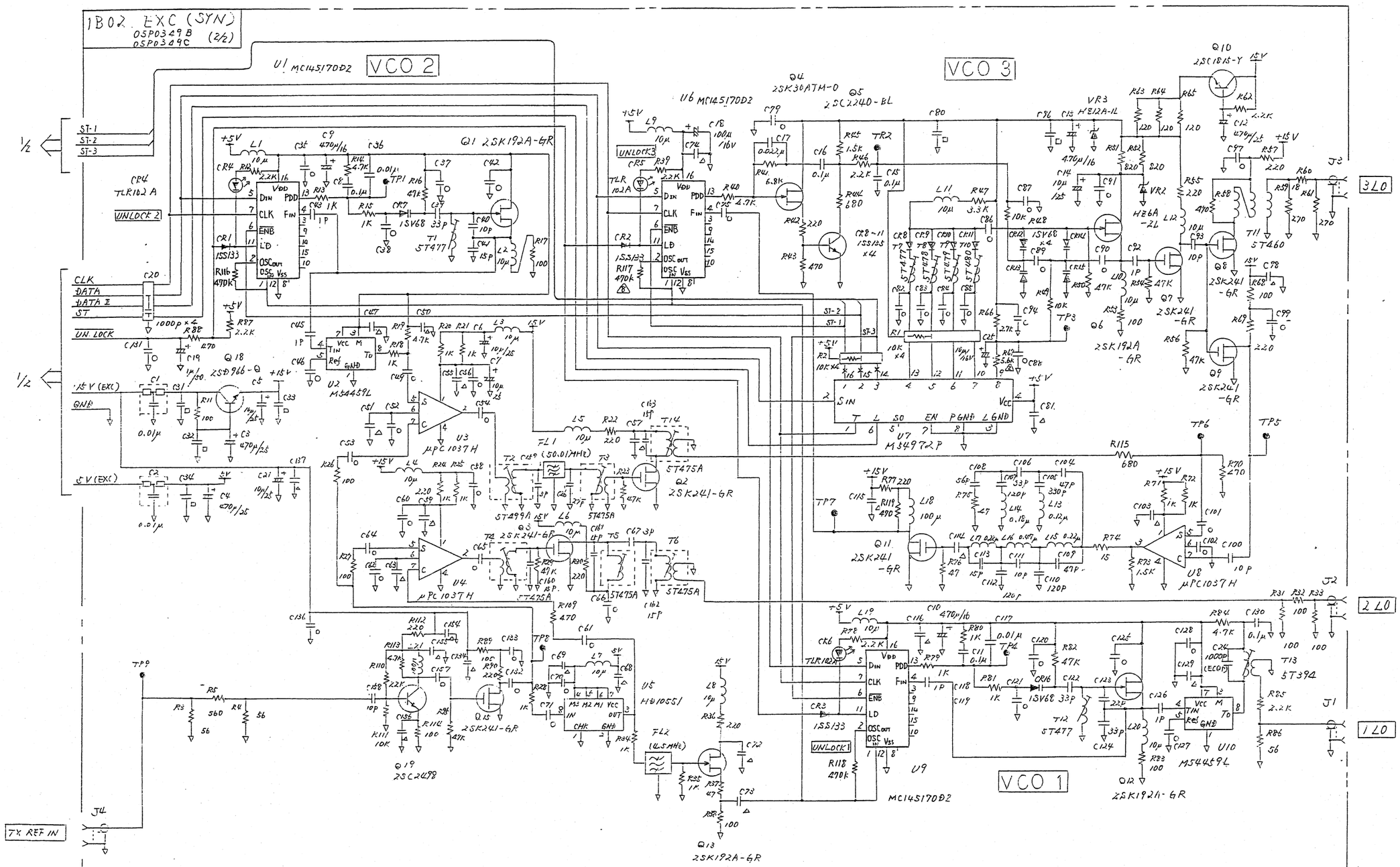
NOTE (1) Resistors are in Ω(0.1W), Capacitors are in F, Inductors are in H, unless otherwise noted.
(2) Marks ○ are 1000pF/50WV capacitors.
△ are 0.01μF/50WV capacitors and
□ are 0.1μF/25WV capacitors.
(3) Mark ※
R19 not provided for 05P0349B

DRAWN 04/03/03 T. YAMASAKI		TYPE	05P0349B/C (1/2)
CHECKED 04/03/04 T. Takeuchi		名称	EXC 基板
APPROVED 04/03/11 M. Hayashi	FS-5000T 1B 02		回路図
SCALE MASS	MODEL BLOCK No.	NAME	EXC PCB
Dwg No. C5519-K09- G	05-001-3323-15		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO

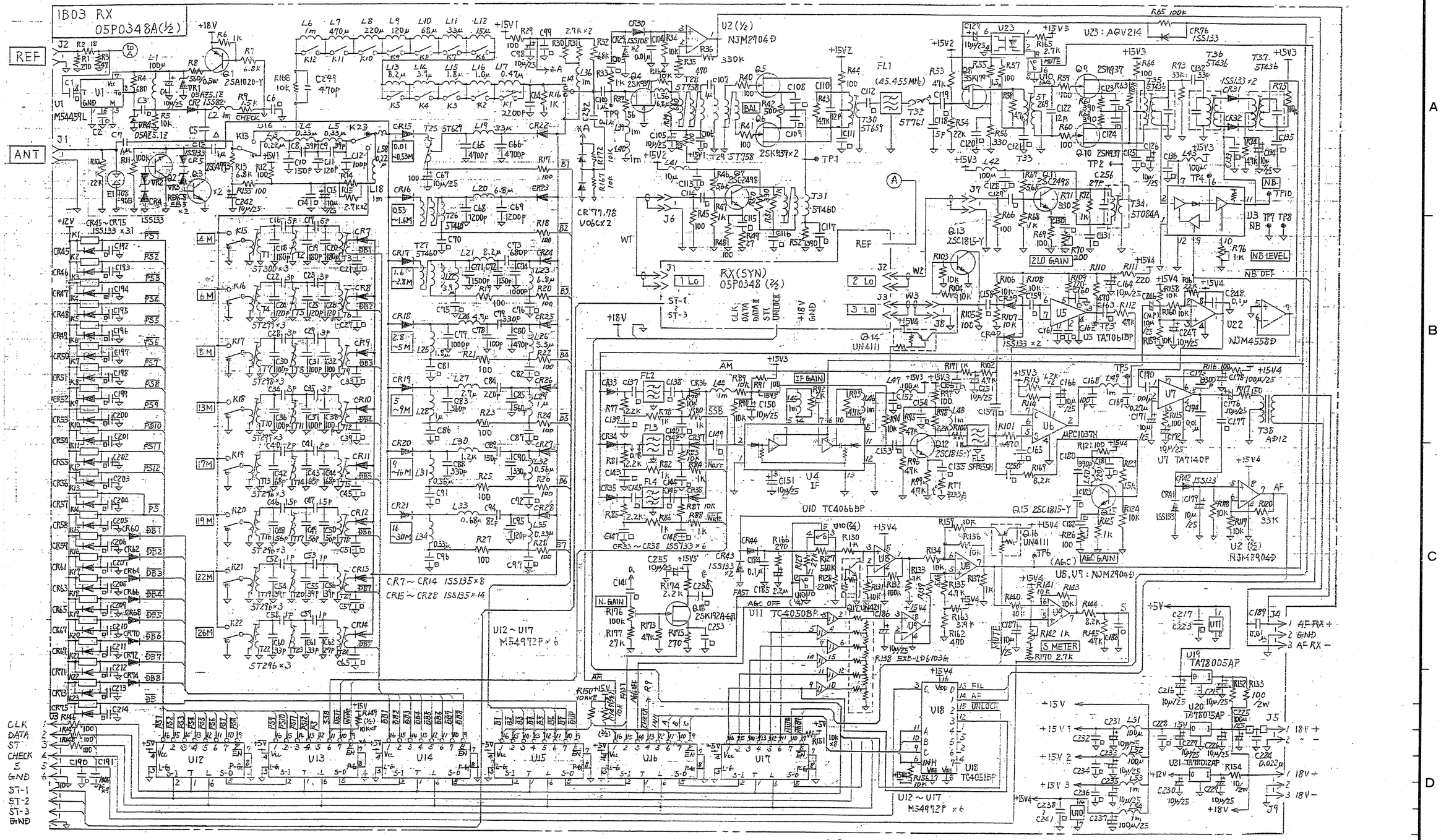
S-4/7



NOTE (1) Resistors are in Ω(0.1W), Capacitors are in F.
Inductors are in H, unless otherwise noted.
(2) Marks ○ are 1000pF/50WV capacitors.
△ are 0.01μF/50WV capacitors and
□ are 0.1μF/25WV capacitors.

DRAWN 04/03/03 T. YAMASAKI		TYPE	05P0349B/C (1/2)
CHECKED 04/03/04 T. Takeno		名称	EXC (SYN) 基板
APPROVED 04/03/11 M. Hayashi	FS-5000T 1B02		回路図
SCALE	MASS / MODEL / BLOCK No.	NAME	EXC(SYN) PCB
Dwg No. C5519-K10- G	05-001-3323-8		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.



Note
1) Marks ○ are 1000pF/50WV Capacitors.
2) Marks △ are 0.01μF/50WV Capacitors.
3) Marks □ are 0.01μF/50WV Capacitors.

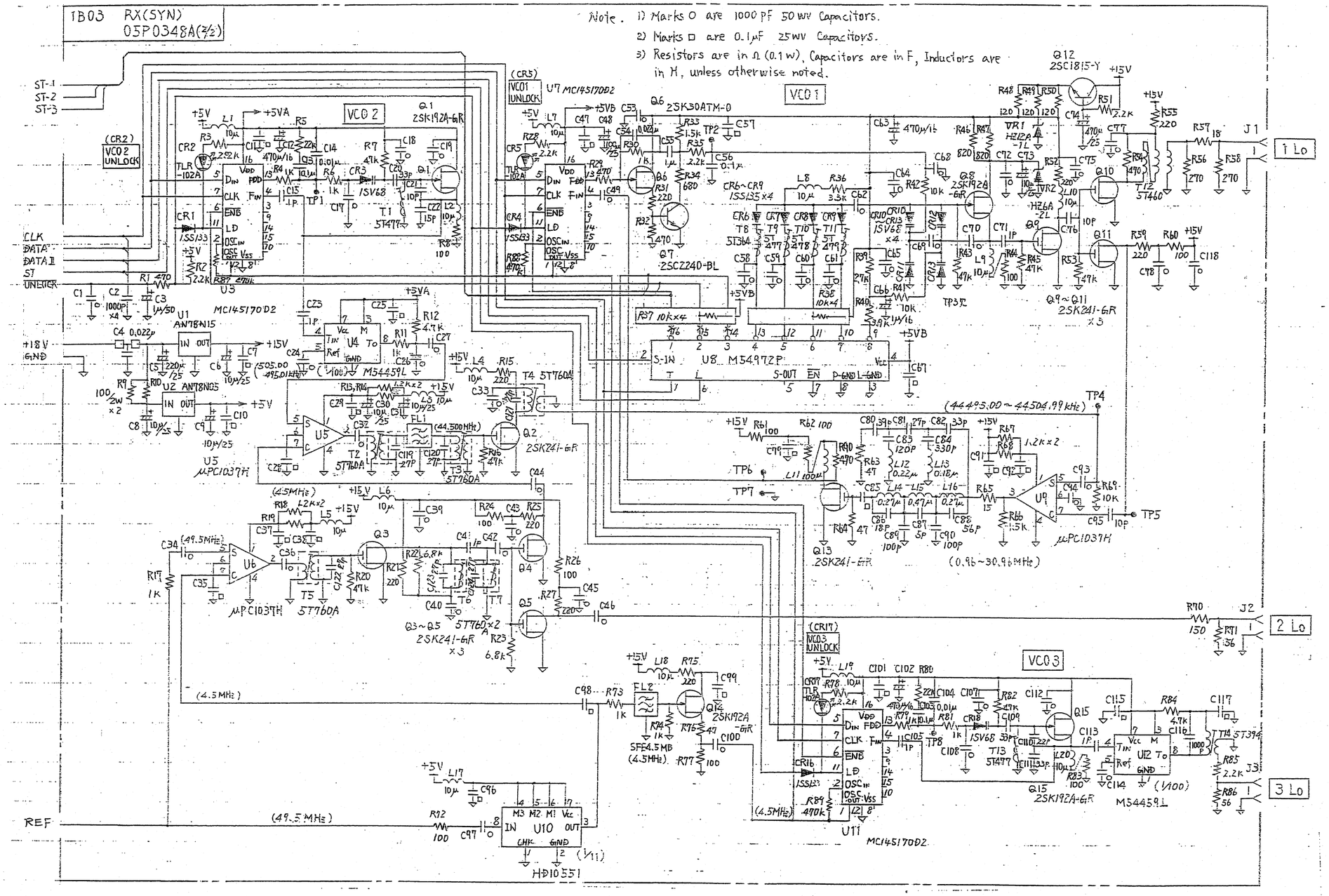
DRAWN 04/03/03 T. YAMASAKI		TYPE	05P0348A (1/2)
CHECKED 04/03/04 T. Takano		名称	RX 基板
APPROVED 04/03/11 M. Hayashi	FS-5000T 1B 03		回路図
SCALE / MASS	MODEL / BLOCK No.	NAME	RX PCB
Dwg No. C5519-K02- F	05-001-3324-16		SCHEMATIC DIAGRAM

FURUNO

S-6/7

1B03 RX(SYN)
05P0348A(2/2)

Note. 1) Marks ○ are 1000pF 50WV Capacitors.
2) Marks □ are 0.1μF 25WV Capacitors.
3) Resistors are in Ω (0.1W), Capacitors are in F, Inductors are in H, unless otherwise noted.



DRAWN 04/03/03 T. YAMASAKI		TYPE	05P0348A (2/2)
CHECKED '04/03/04 T. Takeuchi		名称	RX (SYN)基板
APPROVED '04/03/11 K. Hayashi	FS-5000T 1B 03		回路図
SCALE	MASS MODEL BLOCK No.	NAME	RX(SYN) PCB
Dwg No. C5519-K03- F	05-001-3324-4		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

1B04 CPU
05P0347A

U8
μPD70320GJ-8-5BG
VDD 19,20,55,56
GND 11,51,52
IC(5V) 18,24,47,69
NC 2,22,44,49,50,70,93

NOTE (1) Resisters are in Ω, Capacitors are in F and inductors are in H unless otherwise noted.
(2) VDD and GND pin location.

VDD-14 GND-7	VDD-16 GND-8
TC74HC04	TC74HC138
TC74HC32	TC74HC238
TC74HC86	

DRAWN 04/03/03 T. YAMASAKI		TYPE	05P0347A
CHECKED 04/03/04 T. Takeda		名称	CPU 基板
APPROVED 04/03/11 H. Hayashi	FS-5000T 1B 04		回路図
SCALE / MASS	MODEL / BLOCK No.	NAME	CPU PCB
Dwg No. C5519-K08- D	05-001-3325-2		SCHEMATIC DIAGRAM